British Indo-Asians with Diabetes Mellitus: Their adherence and use of medicinal plants

Volume I

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All research presented in this thesis was solely undertaken by the author except psychological instruments in a Preliminary Study were previously published in the *Handbook of Psychology and Diabetes.*

This thesis is the sole work of the author and has not been submitted for any other degree at any university.

ABSTRACT

This thesis describes investigations of the usage of unconventional therapeutic methods to treat diabetes mellitus, with particular reference to Asian patients. Findings suggest that usage of unconventional therapeutic methods may persist in diabetic patients regardless of their language, religious belief, ethnic and cultural background or psychological states and adherence.

The thesis is presented in two parts. Study 1, a preliminary study, was conducted in Thailand. Groups of adults with diabetes mellitus, aged 17 – 70+ years, were studied to assess the extent to which unconventional therapeutic methods were used, and to examine the possibility that such usage is associated with their psychological states and unsatisfactorily feelings toward orthodox medicine. Data collection was achieved through a combination of well-established and well-evaluated questionnaires and a structured interview. A scale to assess attitudes to diabetes was found to be reliable in this sample, but scales to measure diabetes knowledge and treatment satisfaction were not.

Study 2 was a study of British Indo-Asians in Foleshill, Coventry, England. The extent to which medicinal plants were used was explored and compared between two different cultural and religious backgrounds of adults with diabetes: (1) born in an Asian country and (2) born in England. The majority of participants were old with low educational background and income. A number of modifications were made to the structured interview used in study 1 to make it more appropriate for this sample.

The two studies suggest that usage of medicinal plants is common among diabetics in Thailand and among British Indo-Asian diabetics born in an Asian country. Only a minority of users of medicinal plants in both countries were willing to discuss their usage of medicinal plants with their physicians. This could be because users believed

that their physicians might not approve the usage of non-orthodox treatment. In Thailand, usage of medicinal plants was significantly associated with one factor - a lack of basic diabetes knowledge. In the study in England, a typical user was characterised as an Asian female born in an Asian country, who had a low income, used betel-nut, had a preference for a doctor's ethnicity, and had low treatment satisfaction and adherence scores.

CHAPTER ONE

INTRODUCTION

This chapter begins with a brief discussion on the overall rationale for the thesis. This is followed by a brief history of diabetes and the burden of diabetes in many different regions around the world. It is very difficult to quantify the precise costs of diabetes financially, as the impacts of diabetes are not only on the country's healthcare budget, also on each affected individual's emotional well-being, health and economic status. Therefore, this chapter will cover the overall costs of diabetes in terms of its direct cost (to healthcare budget), indirect costs (e.g. loss of productivity), and intangible costs, which relate to all factors that decrease quality of life of the diabetic person. The second section of the chapter reviews the prevention of diabetes, both primary prevention and secondary prevention, as prevention is believed to be a potential solution to providing for decreased costs of diabetes in the future. The final sections of the chapter discuss use of medicinal plants for diabetes mellitus and factors mediating the decision to use unconventional therapeutic methods such as medicinal plants.

RATIONALE AND AIMS OF THE THESIS

This thesis aims to investigate the use of an unconventional therapeutic method, in this case a use of medicinal plants to treat diabetes mellitus, either in conjunction with or instead of conventional medicine with particular reference to Asian patients. In order to succeed in this task, it is important that topics relating to diabetes and health care problems, and usage of unconventional therapeutic methods, including use of medicinal plants, are reviewed. This first chapter covers the global burden, costs and prevention of and the use of unconventional therapeutic method for diabetes mellitus. Chapter 2 reviews the methods, techniques and the development of questionnaires that are appropriate to identify ways to measuring (1) attitudinal adjustment to having diabetes, (2) satisfaction towards recommended treatments, the health care team, etc., and, (3) self care activity, the components which might influence adherence and use of medicinal plants. This thesis contains two main studies. Study 1 - Preliminary Study (chapter 3) - deals with use of medicinal plants for diabetes in Thailand, where a combination of well-established and well-evaluated questionnaires and a structured interview was used and evaluated for the first time in Thai people with diabetes. A number of modifications were made to the structured interview used in study 1 to make it more appropriate for the samples in study 2 - British Indo-Asians: their adherence and use of medicinal plants for diabetes (chapter 4). The final chapters (chapter 5 and 6) discuss the overall findings from the two studies against the backdrop of issues identified through the literature review.

The reasons for the increased interest and use of unconventional therapeutic methods are not well understood, though many opinions have been offered. Many agreed that the decision to use other treatments, either combined with or instead of orthodox medicine, is mediated by a range of factors. Some have suggested that people may turn to the use of unconventional treatments because they are dissatisfied with the orthodox treatment, or they are experiencing a chronic illness or pain which is difficult to cure (Sharma, 1992). Studies have found that patients who use unconventional therapeutic methods tend to have higher income and educational background than non-users (Sharma, 1992; Astin, 1998). In Britain however, usage of unconventional therapeutic methods for diabetes, in this case the use of medicinal plants, seems most common among people of Indo-Asian origin. Communication barriers may contribute to this pattern, but this is not the only factor influencing the daily management of diabetes and the decision to use medicinal plants. Health beliefs, perceptions and attitudes towards the disease may also be mediated by people's original culture and religious belief, especially in those whose educational attainment is limited (McAvoy and Donaldson, 1990).

HISTORY OF DIABETES MELLITUS

Diabetes - or *diabetes mellitus* to give it its precise medical name – is one of the most widely known and complex diseases since antiquity. The word *diabetes* originates from the Greek for 'siphon', which means 'flow through'. This describes the two main symptoms: a great thirst and a need to urinate persistently. The Latin word *mellitus* was later added. It means 'honeyed'; describing the sugary urine a diabetic excretes when the condition is uncontrolled, due to high levels of glucose circulating in the bloodstream.

Diabetes remains today a worldwide health problem with a high cost from coronary artery disease, blindness, renal failure and amputations. It was mentioned as early as 1500 BC in an Egyptian papyrus scroll, but the condition was first described as diabetes by the Ancient Greek physician Aretaeus of Cappadocia in 100AD (Steven, 1995). The illness was described as 'short and painful'. Subsequent developments in one understanding of the disease are summarised in Watkins (1996). It was long thought that the condition was due to kidney disease (Thomas Willis, 1621-79) or of glucosuria itself (Dobson, 1776). The true scientific understanding of diabetes was later discovered by Claude Bernard (1813-1873) and Mering, Minkowski and Strabourg (1889) when the concepts of glucose production – liver was discovered, which led to a discovery that pancreatectomy causes diabetes. A number of studies were carried out in attempting to extract insulin, but it was not until 1921 when Frederick Banting and Charles Best together with J.J.R. Macleod and the biochemist James Collip successfully extracted and organised the manufacture and distribution of insulin. This revolutionised the treatment of diabetes and prevention of its complications, transforming type 1 diabetes especially from a fatal disease to one which long-term survival became achievable.

GLOBAL BURDEN OF DIABETES

According to King, Aubert and Herman (1998), prevalence of diabetes in adult worldwide was estimated to be 135 million in 1995 and expected to rise to 300 million by the year 2025. To estimate the prevalence of diabetes and the number of people with diabetes, adults aged $\geq$ 20 years of age in all countries of the world for three points in time, i.e., the years 1995, 2000 and 2025 were screened. This study was based on a set of 5-year age- and sex-specific estimates of diabetes prevalence from rural and urban areas of various countries. Criteria recently recommended by WHO (World Health Organisation), i.e., a venous plasma glucose concentration of $\geq$ 11.1 mmol/l 2 h after a 75-g oral glucose challenge, were used to diagnose diabetes mellitus. The prevalence of diabetes appeared higher in developed than in developing countries. The countries with the largest number of people with diabetes were, and will be in the year 2025, India, China, and the U.S. In developing countries, the majority of people with diabetes were in the age range of 45 – 64 years. In the developed countries, the majority of people with diabetes were aged $\geq$ 65 years. It suggested that this pattern would be accentuated by the year 2025. There were more women than men with diabetes, especially in developed countries. Despite failure to include subjects < 20 years of age in the present study, the estimated of King et al (1998) (135 million adults with diabetes for 1995) were larger than a previous study of Amos et al (1997) which estimated 118 million cases at all ages for 1995. This suggests that frequency of diabetes in adults was a close and efficient proxy for global frequency of diabetes at all ages (King, Aubert and Herman, 1998).

Globally, diabetes mellitus (mostly type 2) has emerged in the twentieth century as a public health problem of pandemic proportions. It was stated that in the Americas, the estimated annual incidence of type 1 diabetes varies widely (Libman, 1994) from 0.7 cases per 100,000 in Peru to 27 per 100,000 among males on Prince Edward Island, Canada. The prevalence of type 2 diabetes in Latin America and the Caribbean is thought to range from 1.4 percent among the Mapuche Indians in Chile to 17.9 percent among adult Jamaicans (Libman, 1994; Ragoobirsingh et al., 1995). Type 2 diabetes is most prevalent in the Pima Indians of Arizona, among whom the majority of the adults have the disease (Knowler et al., 1990).

In the UK, 1.4 million have been diagnosed with diabetes (Boyle et al., 1998), and it is thought that at least a million more have it but do not know it yet (Forrest et al., 1986; Simmons, 1991). It was also found that the prevalence of diabetes, especially type 2, is approximately 3 to 6 times more common among people of Indo-Asian origin living in the UK (Mather and Keen, 1985; Simmons, 1991; Primates and Brookes, 1999). Among these people, diabetes tends to develop at a younger age, approximately 5 years younger than in Caucasians (UKPDS XII, 1994). Diabetes seems to be most prevalent in the deprived areas of the UK (Riste et al., 2001), the areas of which a large number of ethnic minorities, typically Indo-Asians, are situated.

On the other hand, while social deprivation in the UK and USA is a factor for diabetes, in India affluence may be a factor - "the higher the affluence, the higher the diabetes incidence" (Unknown author, 2003). Rural India, where diet and lifestyle has changed little over the years, displayed less than 2 percent incidence of diabetes. However, in urban areas with greater relative affluence (with *richer* diets and more sedentary lifestyle), the incidence is tripled (Unknown author, 2003). In 1995, India was one of the countries with the largest number of people with diabetes (19 million), and is projected to have 57 million in year 2025 (King, Aubert and Herman, 1998). The greatest increase between 1995 and 2025 is expected to occur in India, 195 percent.

In Thailand, a sharp increase in incidence has been seen over the past three decades as migration to cities has occurred with subsequent lifestyle and diet changes. Ywin (year not specified) reported that approximately 18,000 diabetics were seen yearly by a general hospital specialising in diabetes. In 1965, less than 2.5 percent of the population had diabetes. In the year 2000, this had increased to 4.8 percent (Unknown author, 2003). Urban incidence is three times greater than rural incidence, similar to India (Unknown author, 2003). With many people in Thailand living on relatively low income, it is important that free medication is available to those suffering poverty. Likitmaskul et al. (2003) found diabetes mellitus, typically type 2, in children and adolescents has increased from 5 percent during 1986 – 1995 to 17.9 percent during 1996 - 1999. The findings indicated that the increase of type 2 diabetes among these people was associated with an increase of obesity. The authors emphasized the importance of encouraging daily physical activity and healthy diet in the prevention program against diabetes complications.

The study of King, Aubert and Herman (1998) also contains estimates of sex ratios, urban-rural ratios and age structures of the diabetic population. In 1995, for the world as a whole, there were more women than men with diabetes (73 million vs. 62 million). The female excess was distinctive in the developed countries (31 million vs. 20 million), however for the developing countries, diabetes seems to be equally distributed between the sexes (42 million in each case). King, Aubert and Herman (1998) estimate that by 2025 the worldwide female excess will decrease (159 million vs. 141 million). For many developing countries, a considerable increase of people affected by diabetes, especially in the urban arrears is predicted. In migrant populations worldwide, especially Indian and Chinese migrants, relative prevalence was high when compared with indigenous communities (King and Rewers, 1993). According to the projections of King, Aubert and Herman (1998), if the present trends persist, by 2025 most people with diabetes in developed countries would be aged 65 years or more, while the majority of people with diabetes in the developing countries would be 45-64 year olds. This means that in less than 30 years from now some millions of men and women, who reside in the developing parts of the world, would be suffering from diabetes in their *most productive years of life.*

COSTS OF DIABETES

Diabetes mellitus causes a considerable burden for affected individuals and the society they live in. This burden is not only related to health care costs, but also to indirect costs caused by loss of productivity from disability and premature mortality. It was estimated that diabetes alone claims on average around 8 percent of total health budgets in developed countries (World Health Organisation, 2002). This section reviews briefly the costs of diabetes mellitus in terms of: (1) its effect for an individual and family and for the health authorities (direct costs); (2) costs of lost production (indirect costs); and (3) intangible costs, which relate to all factors that decrease quality of life of the diabetic person. Prevention of diabetes, both primary prevention and secondary prevention, is briefly discussed, as it is believed to be a potential solution to providing for decreased costs of diabetes in the future.

It is difficult to quantify the exact costs of diabetes but broadly speaking they fall into three categories:

(1) Direct costs

Direct costs to individuals and their families include medical care, drugs, insulin, testing equipments and other supplies (Gold et al., 1996). Patients may also have to face other personal costs, such as increased payments for health, life and auto insurances.

Direct costs to health care sectors include the diagnosis and management of diabetes itself, hospital services, physical services, lab tests and other costs in the daily management of diabetes for in- and out-patients - which includes availability of insulin, oral medications, syringes and other blood testing equipment. Costs vary widely from relative low-cost items, such as primary-care consultants and hospital outpatient episodes, to very high-cost items, such as long-term hospital inpatient care where treatments for complications are required.

Gray, Fenn and McGuire (1995) estimated the direct health and social care cost of type 1 diabetes mellitus (otherwise known as Insulin dependent diabetes mellitus or IDDM) in England and Wales in 1992 to be £1,021 per person in a population with type 1 diabetes mellitus estimated at 94,000 individuals. These costs included insulin maintenance, hospitalisation, GP and out-patient consultations, renal replacement therapy and payments to informal care. Expenditure was concentrated on younger groups, with one-third of the total expended on those aged 0 – 24.

Medical expenditure for people with diabetes is 2 – 3 times higher than for those not affected by diabetes (Rubin et al., 1994). In many developing countries such as Thailand, and even developed countries like the UK, many people with diabetes, typically the ethnic minority groups (Hawthorn, 1994) have limited access to health care, which means that indirect costs may exceed direct health care costs. Diabetes and non-communicable diseases (cardiovascular diseases, cancer, chronic respiratory diseases and hereditary disorders) presents a challenge for most health care systems in most countries. In Thailand, for instance, as lifestyle changed - more obesity, aging and growth, prevalence of diabetes has increased and it is here to stay. Diabetes is a chronic disease that requires lifelong, continual medical care and attention. If health care in Thailand and many other developing countries are unable to cover the medical care costs required by its people affected by diabetes, it is likely that indirect costs and intangible costs be on the increase (Unknown author, 2003).

Costs associated with insulin and oral medications were around £2,950 million, hospitalisations £632 million, consultations £2,508 million and care for complications was £1,505 million. The total annual cost associated with diabetes was estimated as £40,760 million (direct £6,700; indirect £34,059).

Studies in India estimate that, for a low-income Indian family with an adult with diabetes, as much as 25 percent of family income may be devoted to diabetes care (Unknown author, 2003).

For families in USA with a child who has diabetes, the corresponding figure is 10 percent (World Health Organisation, 2002). The total costs of a person with diabetes in the USA are between twice and three times those for people without the condition. It was calculated that the cost of treating diabetes in the USA in 1997 alone was approximately £27.5 billion.

Diabetes costs 9 percent of the annual expenditure of the National Health Services Budget (£2.84 billion) in Britain (Currie et al., 1997). This presents a total of £256 million for the year 1998/9 (Key Health Statistics for Wales, 2000). The total costs of diabetes, however, almost doubled in year 2000 (£5.2 billion per annual) (Diabetes UK, 2003). This is equivalent to £99, 717,567 a week, £14,2454,367 a day, £593,560 an hour, £9,893 a minute and £165 a second. These quantified costs broadly fell into (1) costs linked directly to the diagnosis and management of diabetes, for example the cost of in-patient and out patient care and of medications and testing equipments, (2) costs related to management of complications of diabetes, and (3) costs related to the impact of diabetes on work and the quality of life.

(2) <u>Indirect costs</u>

Indirect costs relate to lost production, e.g. absence from work, sickness, disability, premature retirement or premature mortality, which can cause loss of productivity (Gold et al., 1996). Estimating the costs to society of this loss of productivity is complex, and these costs can vary widely between studies depending on factors including when estimates were made, loss of unpaid labour such as the value of housekeeping services, caregiver costs and leisure time (Barceló, et al., 2003). This can lead to costs of lost production being as great or even greater than direct health care costs. Barceló et al. (2003) found that indirect costs are greater than direct costs, and indirect costs accounted for 82 percent of the total costs. This finding differs from studies in USA (American Diabetes Association, 1998) and Canada (Dawson et al., 1998). Nonetheless, Barceló et al. believed that the occurrence of underestimated costs of medical care in their study was due to the lack of coverage of continuous care for a significant proportion of the population with diabetes in the areas they studied. It should not be forgotten that an increase in access to care would also increase the direct costs related to diabetes and, if care is effective, this may reduce the indirect costs of mortality and rates of disability related to diabetes.

Barceló and colleagues (2003) also pointed out that the calculation of *out-of-pocket* expense should be included when estimating costs of diabetes. A study in Jamaica reported that 57 percent of interviewed people with diabetes experienced financial difficulties because of illness and that 50 percent of those admitting economic difficulties reportedly avoided some medical treatment because of economic constrain's (Henry-Lee and Yearwood, 1999).

In Latin America and the Caribbean, it was estimated that the annual number of deaths in 2000 caused by diabetes was at 339,035 (Barceló, et al., 2003). Barceló and colleagues have also found a loss of 757,096 discounted years of productive life among people younger than 65 years, a loss of 12,699,087 years and over £31 billion through permanent disabilities, and a loss of 136,701 years in the working population and over £476 million through temporary disabilities.

In England and Wales, indirect cost is significant. Over one million pounds may be lost each year due to premature deaths resulting in lost productive contributions to the economy (Gray, Fenn, and McGuire, 1995).

(3) <u>Intangible costs</u>

Intangible costs relate to the relationship between diabetes and complications related to diabetes and quality of life of people affected by the condition(s) and his/her family

(World Health Organisation, 2002). Negative personal relationships, less of leisure and mobility, pain, anxiety, inconvenience and many other factors can all decrease quality of life, which are just as important as tangible direct and indirect costs. Some activities may have to be foregone in favour of treatment, discrimination may be experienced in the workplace, obtaining jobs may be more difficult, and professional life may be shortened because of complications leading to early disability and even death.

PREVENTION AND TREATMENT OF DIABETES

It is clearly known that effective prevention means more cost-effective healthcare (World Health Organisation, 2002). This may be primary prevention such as the prevention of the onset of diabetes itself or secondary prevention, which includes the prevention of its immediate and long-term consequences. This section briefly describes and evaluates the two types of prevention and also considers care recommendations suggested by Diabetes UK.

Primary prevention introduces and educates people, especially those at high risk of developing diabetes, to a healthy lifestyle in order to protect susceptible individuals from developing the disease. The first major trial in Finland found that by promoting healthy lifestyle through diet and exercise (approximately 30 minutes physical activity daily and weight loss of 5kg) the onset of type 2 diabetes was significantly delayed by 58 percent in people known to be at higher risk for type 2 diabetes. This group includes those aged 60 and older, women with history of gestational diabetes and people with a first degree relative with type 2 diabetes in all the ethnic groups (Tuomilehto et al., 2001; Valsamakis et al., 2002). The same study also found that treatment with the oral diabetes drug metformin (Glucophage) also reduced diabetes risk by 31 percent, though less dramatically, in older volunteers and in those who were less overweight (Tuomilehto et al., 2001). This kind of preventive measures should be more effective if a continuous education programme supports it. Such preventive measures will have benefits above and beyond diabetes preventation since improvement in diet and daily physical activity will reduce obesity, the condition which leads to many major cardiovascular diseases and other disorders. This type of measure is not easy, but is likely to be cost effective if it could be implemented on a population scale (World Health Organisation, 2002). This type of prevention should be considered particularly in the poorest regions of the world where resources are severely limited. It is not known if this kind of program could prevent diabetes altogether. It can, however, prolong years of life free of the pain, disability, and medical costs incurred by the disease.

Secondary prevention measures are programs which include early detection of diabetes, (especially in people who are at high risk of developing the disease), and apply appropriate actions and treatments so that hospital admission, complications and premature death are delayed or prevented. There are a number of excellent examples regarding secondary preventive programs, which have been shown to be cost-effective for long-term health care and beneficial to the individuals with diabetes.

Studies indicate that tight blood glucose control can significantly reduce the incidence of diabetic retinopathy, nephropathy, and neuropathy, but does not appear to significantly reduce macrovascular complications (conditions related to the large blood vessels of the body, which include heart diseases, stroke and gangrene) (Schrier, 2000; O'Connor et al., 1998; UKPDS 38, 1998). Tight glycemic control may also prevent diabetic foot problems (Defronzo and Reasner, 1994).

O'Connor et al., 1998 found that good glycemic control with metformin may reduce overall mortality in obese patients with type 2 diabetes, and improved blood pressure reduced diabetes-related mortality. The same study also indicated that major cardiovascular disease in type 2 diabetes could be prevented by control of blood pressure with low-diuretics, atenolol, or angiotensin-converting enzyme inhibitors; by use of aspirin; and by use of simvastatin to lower low-density lipoprotein (LDL) cholesterol.

It was stated that the beneficial effects of tight blood pressure control are even more effective than tight blood glucose control (Mogensen, 1998). A long-term tight blood pressure control in hypertensive patients with type 2 diabetes results in a significant reduction in all diabetes related deaths (UKPDS 38, 1998). A number of studies confirmed that lowering blood pressure can independently slow the progression of nephropathy (Schrier, 2000; O'Connor et al., 1998), and can be advantageous for prevention and halting progession of both microvascular (conditions related to small blood vessels of the body, which include retinopathy, nephropathy and neuropathy) and macrovascular complications in patients with diabetes (Podar and Tuomilehto, 2002). Therefore use of angiotensin-converting enzyme (ACE) inhibitors as antihypertensive agents in both type 1 and type diabetes is highly recommended (Podar and Tuomilehto, 2002; Schrier, 2000; O'Connor et al., 1998; Zanella et al., 2001; Mogensen, 1998; Macdonald et al., 1998).

Screening and early treatment for retinopathy is also very cost-effective, given the devastating direct, indirect and intangible costs of blindness (World Health Organisation, 2002).

Screening for protein in urine is another valid preventive measure to prevent or slow down the progression to kidney failure. There is evidence that screening for traces of protein is cost effective, as it allows even earlier intervention in the natural course of kidney disease (World Health Organisation, 2002).

Measures to reduce or to cease the consumption of tobacco will also assist in the management of diabetes. Cigarette smoking is thought to be another possible cause of diabetes (Rimm et al., 1995), besides the better-known increased risk for cardiovascular disease. It was found that cigarette smoking increases risks for micro- and macrovascular complications, typically in patients with type 1 diabetes (Eliasson, 2003). In diabetes care, smoking cessation is of utmost importance to facilitate glycemic control, blood pessure control and limit the development of diabetic complications.

A number of major drug groups are recommended and prescribed as secondary prevention in patients with diabetes (Macdonald et al., 1998): (1) beta-blockers as antihypertension agents; (2) Aspirin; (3) statins as lipid-lowering agents; and (4) Angiotensin-converting enzyme inhibitors (ACEIs). Cadaval and colleagues (1996) found beta-blockers improve insulin resistance condition in obese patients, and Macdonald and colleagues (1998) indicated that beta-blockers could reduce mortality by 35 percent. In clinical practice, beta-blockers are frequently used to help lower blood pressure and to assist in secondary prevention of myocardial infarction. It was suggested that every diabetic patient should receive beta- blockers post myocardial infarction (Macdonald et al., 1998). However, according to Mogensen's review (1998), both beta-blockers and ACEIs are probably not necessarily beneficial to those diabetics with a hypertensive condition. The author suggested that larger and longer trials are needed to assess the endpoint effects of both drugs, such as progressive nephropathy and end stage renal disease.

USE OF MEDICINAL PLANTS AS A TREATMENT FOR DIABETES MELLITUS

The recorded use of plants in the traditional treatment of diabetes dates from the Ebers papyrus of about 1550 BC, where a high-fibre diet of wheat grains and ochre were recommended (Bailey et al., 1986). Hundreds of different types of plants and plant extracts have been described as reputedly beneficial for people with diabetes around the world. The majority of these plants have been claimed to possess hypoglycaemic properties however most claims are anecdotal and few have received adequate scientific evaluation. Accordingly the World Health Organisation (1980) has recommended accordingly that traditional plant treatments for diabetes mellitus warrant further evaluation. Medicinal plants for diabetes mellitus can be categorized into three groups as follow: (1) plants from which a hypoglycaemic compound or fraction has been evaluated; (2) plants reported to exert a hypoglycaemic effect, but the active principal is unestablished; and (3) plants reported to exert a hypoglycaemic effect, but the scientific evidence is equivocal (Bailey and Day, 1989). This section sets out to review merely the first two categories of most commonly used anti-diabetic plants around the world, but exclude a number of claimed traditional plants for diabetes mellitus which their medical evaluation are equivocal and/or have not been published.

1. Evaluation of hypoglycaemic principle(s) from medicinal plants

The evaluations of the plants reviewed here are from both animal and human experiments. Though many hypoglycaemic properties or compounds of plants are evaluated, it is too early to confirm their efficacies for the treatment of diabetes mellitus.

Many hypoglycaemic effects found in animal trials may not be transferable to humans (Ernst, 1997), and use of any kind of plant must not be introduced unless rigorous tests in all phases of clinical trials are carried out (Ernst, 1997; Grand et al., 1998). The major molecular species with hypoglycaemic principles that have been identified are alkaloids, glycosides, and polysaccharides.

Raw and cooked onion (*Allium cepa*) and garlic (*Allium sativum*) have been used as dietary supplement for diabetes in many regions in the world (Day, 1984). Studies suggested that diphenylamine is a hypoglycaemic principal in onion (Day and Bailey, 1986; Karawya et al., 1984). The extracts from these plants produced a weak hypoglycaemic effect in healthy and alloxan-induced diabetic animals and humans (Augusti and Benaim, 1975; Day and Bailey, 1986; Jain and Vyas, 1973; Jain et al., 1974). In these studies, fasting blood glucose concentrations were lowered and oral glucose tolerance was improved by 7 – 18 percent within 1 – 2 hours after oral administration of aqueous and ethanol extracts of onion and garlic at doses of 10g extract/ body weight. Sharma (1977) found a similar result in 20 healthy volunteers (18males and 2 females). Blood glucose levels of all volunteers were reduced after an administration of 100g onion extract for 30 minutes before and after the ingestion of glucose (up to 17.8% in 1½ hr). However, *Allium* species might not be effective in some severe diabetic cases, for example in streptozotocin-induced diabetic animals (Day and Bailey, 1986). Apart from being beneficial for glycaemic control, *Allium* species also reduced body weight loss in streptozotocin diabetic mice, giving the mice a healthier coat condition and appearance (Swanston-Flatt et al., 1990).

Periwinkle (*Catharanthus roseus*) is claimed to contain hypoglycaemic alkaloids. Leaf infusions and decoctions of periwinkle are widely used as a traditional treatment for diabetes, especially among people with type 2 diabetes in Northern Europe (Swanston-Flatt et al., 1989). Drinking (6.25 per cent by weight of diet) decoctions of dried periwinkle leaves infused for 15 minutes in boil water for 28 days offered some metabolic benefit (significantly reduced weight loss) but did not significantly affect the glycaemic control (Swanston-Flatt et al., 1989). However, many major alkaloids isolated from this plant, including leurosine, vindolin, vindolinine, and catharanthine, weakly reduced hypoglycaemia within 2 – 5 hours in healthy rats, but were not sufficient to encourage further investigation (Farnsworth and Segelman, 1971).

Trigonella foenumgraecum (fenugreek) is widely cultivated as a food crop in India, the Mediterranean region, North Africa and Yemen. The seeds of fenugreek are used quite extensively to flavour food and stimulate appetite, and as a traditional plant medicine among people with type 2 diabetes. Chemical analysis of fenugreek indicates that the seeds are rich source of protein, unavailable carbohydrate, mucilages and saponins (Al-Habori and Raman, 1998). The seeds exhibited a weak hypoglycaemic effect in alloxan-induced diabetic rats (Shani et al., 1974). The hypoglycaemic activity has been attributed to an uncharacterised alkaloid termed *trigonelline*, other possible hypoglycaemic agents such as nicotinic acids have also been isolated from the seeds (Shani et al., 1974). Ribes et al. (1984) found that only the defatted fraction of fenugreek decreased hyperglycaemia and glycosuria in diabetic dogs, but the lipid extract fenugreek had no effect. Though the defatted fraction of fenugreek was responsible for the anti-diabetic action, the authors could not confirm whether the effects were caused by an unknown pharmacological compound or by the gastrointestinal action of the fibres. The high fibre content of the seeds (50-60 per cent) might also contribute to a beneficial effect in diabetic patients (Madar et al., 1988). Similar effects were reported in healthy human volunteers given 25g/day of fenugreek powder mixed in their diet (Sharma, 1986). Fenugreek seeds (whole as well as extract) diminished hyperglycaemia in healthy volunteers and diabetic patients. Fasting blood glucose, 24-h urinary sugar excretion and serum cholesterol were also significantly reduced in these subjects. Ha-Bori and Raman (1998) suggested that hypolipidaemic effects (reduction of LDL-cholesterol) were associated with the saponins and not the fibre, and that since fenugreek has no toxicological effects, consumption of defatted fenugreek may be beneficial in the management of diabetes and hypercholesterolaemia.

Though *Tecoma stans* has been used as a traditional treatment of diabetes, its medical evaluation is limited. The hypoglycaemic activity of *Tecoma stans* may due to two hypoglycaemic alkaloids: tecomine and tecostanine (Hammouda and Khallafallah, 1971). These alkaloids exerted a rapid hypoglycaemic reaction (within 2 hours) when administered intravenously to healthy and alloxan-induced diabetic animals (Hammouda and Khallafallah, 1971). Scientific evaluation of seeds of *Lupinus ternis* (lupin) is also limited, although they are widely used as an alternative treatment for diabetes by Yemenite Jews. Ajgaonkar (1979) and Shani et al (1974) found a fraction rich in quinolizidine alkaloids from lupin exerted merely a brief glucose lowering effect in alloxan-induced diabetic rats, but not in the healthy ones.

The anti-hyperglycaemic effect of *Coccinia indica* (ivy gourd) has been demonstrated in a double-blind trial in patients with type 2 diabetes (Khan et al., 1980). Administration of 6 tablets/day (dose unspecified) prepared from the homogenised and freeze-dried leaves of ivy gourd decreased basal glucose concentration by 20 per cent and similarly improved oral glucose tolerance after 6 weeks. Administration of aqueous and ethanol extract of ivy gourd root decreased glucose levels almost 50 per cent in healthy rabbits at a dose of 1.25g/kg (Ajagaonkar, 1979), and an uncharacterised alkaloid has been implicated as an active principle.

Mormodica species such as *Mormodica charantia* (karela) and cerasee are the most well-known anti-diabetic plants in the world. They are cultivated fruit grown widely in many regions such as in Asia (India, China and Thailand), Australia, Central America and West Africa. All parts of karela are known to possess anti-diabetic property (Bailey et al., 1986). The use of karela is common in Asian and West Indian immigrants living in Britain (Bailey et al., 1986). The scientific and medical evaluations of *Mormodica* species, *Gymnema sylecvestre*, ivy gourd, *Aloe vera*, Indian cluster bean, sesame, *Stevia rebaudiana*, and coriander and many more are discussed in Chapter 3 and Chapter 4.

Several anti-diabetic plants from the Orient have recently been shown to contain anti-hypoglycaemic polysaccharides and peptidoglycans (i.e., *Aconitum carmichaeli*, *Anemarrhena asphodeloides*, *Atractylodes japonica*, *Dioscorea japonica*, *Eleutherococcus senticosus*, *Ephedra distachya*, *Ganoderma lucidum*, *Lithospermum erythrorhizon*, *Oryza sativa*, *Panax gisenge*, *Panax quinquefolium*, and *Saccharum officinarum* (Konno et al., 1985a; Takashi et al., 1985; Konno et al., 1985b; Hikino et al., 1986; Hikino et al., 1986; Konno et al., 1985c; Hikino et al., 1986; Konno et al., 1984; Oshima et al., 1987; Takahashi et al., 1985). At doses up to 100 mg/kg body weight the principles from these plants reduced glucose concentration in alloxan-induced diabetic animals within 7 hours. Polysaccharide from each plant reduced glucose concentration by 20 per cent in the alloxan-induced diabetic animals, and the hypoglycaemic effect was often still in evidence after 24 hours.

Agrimony eupatoria (agrimony, cocklebur, stickwort) is indigenous to Europe, and has been traditionally utilized for its anti-diabetic properties (Swanston-Flatt et al., 1990; Gray and Flatt, 1998). Chronic administration of agrimony has been demonstrated to reduce polydipsia (excessive thirst) and alleviate the hyperglycaemia of streptozotocin-induced diabetic mice (Swanston-Flatt et al., 1990; Gray and Flatt, 1998), to counter weight loss and hyperphagia (overeating) in diabetic mice, and to retard the development of streptozotocin diabetes in mice (Gray and Flatt, 1998). Gray and Flatt (1998) discovered that an aqueous extract of agrimony (1mg/ml) enhanced glucose transport, glucose oxidation, glycogenesis (the transformation to glycogen from blood glucose) and lactate release comparable with that evoked by 0.01 ųM-insulin.

Fresh agrimony contains a glucoside alkaloid, traces of essential oil and organic acids, vitamin B_1, vitamin K, and ascorbic acid (Duke, 1985). Agrimony leaf has been reported to contains 0.1 – 0.3 mg nicotinic acid (Duke, 1985), a compound which shown to ameliorate islet function in partially depancreatized rats (Okamoto, 1992).

Vaccinium myrtillus (bilberry) was widely used as a treatment for diabetes before the availability of insulin, and an active glucoside principle (neomyrtillin) was extracted (Bailey and Day, 1989). Neomyrtillin was reputedly effective in reducing glycosuria and postprandial (after meal) hyperglycaemia in people with type 2 diabetes, but was rarely effective in people with type 1 diabetes (Bailey and Day, 19989). Bilberry may also benefit diabetic patients with cataract problems (Head, 2001). Bilberry contains many vitamins including E, C and selenium which have a potential benefit for glaucoma, helping to prevent cataracts (Head, 2001). *V. myrtillus* extracts are anecdotally claimed to be well tolerated and did not produce adverse side effects. However, the medical evidence is limited, with merely one article found via a Medline search (Head, 2001).

An aqueous extract of banyan tree bark (*Ficus benghalensis*), used traditionally in many Asian countries, contains a flavonoid glycoside termed bengalenoside (Ajgaonkar, 1979) and Dimethoxy ether of Leucopelargonidin-3-0-alpha-L rhamnoside (Augusti et al., 1994). This produced a mild hypoglycaemic effect in healthy and alloxan-induced diabetic rodents (Ajgaonkar, 1979). In contrast, an oral dose (100mg/kg) showed significant hypoglycaemic and serum insulin raising action in normal as well as moderately alloxan-induced diabetic dogs during a period of two hours (Augusti et al., 1995). Administration of banyan bark doses (0.2 – 1.8 g/kg) did not show any toxic effect in experimented animals (Augusti et al., 1995).

Amorphophallus konjac (konjac plant) also used as a treatment for diabetes in many developing countries. Its hypoglycaemic effects may due to the polysaccharide glucomannan (Vinik and Jenkins, 1988) and three oligosaccharides isolated from this plant (Lu et al., 2002). The hypoglycaemic properties of this plant have recently been evaluated (Doi et al., 1983; Vinik and Jenkins, 1988; Huang et al., 1990; Vuksan et al., 1999; Vuksan et al., 2000; Lu et al., 2002). These studies have discovered that administration of konjac plant in food can significantly reduced blood glucose concentration (fasting blood glucose, 2-h postpradial blood glucose and glycosylated hemoglobin level) by up to 20 mg%, and hypertriglyceridemia level by 118 mg% in patients with impaired glucose tolerance and type 2 diabetes. Merely one study discovered a side effect, a transient complaint of flatulence and soft stools reported by three participants (11 participants in total) during the experiment (Vuksan et al., 2000). Konjac plant is rich in high viscosity and fibre (Vuksan et al., 2000). Food high in fibre (20 – 30 grams of dietary fibre daily from a wide variety of food sources) is highly recommended as a useful source of energy for people with diabetes mellitus as it slowly releases energy (Hess, 1996). It was concluded that konjac food is very useful in the prevention and treatment of hyperglycaemia (Doi et al., 1983; Vinik and Jenkins, 1988; Huang et al., 1990; Vuksan et al., 1999; Vuksan et al., 2000; Vuksan et al., 2001; Lu et al., 2002; Chen et al., 2003).

Another group of hyperglycaemic principles is the aminopropylpropionic acid derivatives isolated from the unripe fruit of *Blighia sapida* (ackee fruit), a traditional plant treatment for diabetes in Central America and Africa (Bressler et al., 1969). Aminopropylpropionic acid showed hypoglycaemic effects in healthy and induced diabetic animals, promoting glucose use and inhibiting gluconeogenesis (a transformation of sugar from protein or fat when there is lack of available carbohydrate) secondary to the inhibition of long-chain fatty acid oxidation (Bressler et al., 1969). Though the beneficial effects of this fruit seemed promising. The claim for hypoglycaemic property of *Blighia sapida* remains anecdotal. According to the Medline search engine (meshed Medline for *Blighia sapida* and ackee fruite), there is no medical evidence and evaluations published at present.

Galega officinalis (Goat's rue or sometimes known as French Lilac) is well known for its hypoglycaemic action and has been used as part of a plant mixture in the treatment of diabetes mellitus. Petricic and Kalogjera (1982) indicated guanidine, a substance isolated from this plant, as a hypoglycaemic agent. This extract has been shown to also retard the development of streptozotocin-induced diabetes in mice (Swanston-Flatt et al., 1990). Palit et al. (1999) discovered that goat's rue (10 per cent body weight/weight in diet) also caused a significant reduction in body weight in both normal and genetically obese animals treated for 28 days. The mechanism of weight reducing action remains unclear, but it was suggested that the reduction in weight, which involved loss of body fat, might be due to a reduction in food intake (Palit et al., 1999).

Mustard (*Brassca juncea*) leaf and seeds are used and consumed as a spice in various food items in India. They have also been used for the treating diabetes mellitus (Yokozawa et al., 2002). Isorhamnetine diglucoside, a major flavonoid compound, is the hypoglycaemic principle of mustard. Oral administration of isorhamnetin diglucoside (10 or 20 mg/kg of body weight/day for 10 days) to rats with streptozotocin-induced diabetes significantly reduced serum levels of glucose and glycosylated haemoglobin and lipid peroxidation in blood, liver and kidney (Yokozawa et al., 2002). Similarly, oral administration of 5, 10 and 15 per cent of Mustard seeds significantly reduced hyperglycaemic levels in alloxan-induced diabetic rats but not in streptozotocin-induced diabetic rats (Grover et al., 2002).

Many anti-diabetic plants used in some underdeveloped regions may be useful people with type 2 diabetes and for non-classical types of diabetes such as tropical pancreatic diabetes (Mohan et al., 1985). For example a traditional use of an infusion of alfalfa (*Medicago sativa*) leaves in South Africa may be associated with the high manganese chloride which has been shown to exert hypoglycaemic action and reduce polydipsia and weight loss in streptozotocin induced diabetic animals (Swanston-Flatt et al., 1990) and in people with type 1 diabetes (Reddy and King, 1987). An anti-diabetic effect of alfalfa might also be associated with the plant's high concentration of vitamin K (Swanston-Flatt et al., 1990). *Poterium spinosum* is an ion-rich anti-diabetic plant used in desert regions of the Middle East (Kanter et al., 1984). Consumption of a root infusion (amount not specified) is reported to eliminate symptoms of diabetes (Steinmetz, 1964).

Various types of potatoes are claimed to possess hypoglycaemic effects, such as white-skinned sweet potato (*Ipomoea batatas*) (Kusano et al., 2001; Ludvik et al., 2003), English potato (Ayuo and Ettyang, 1996), and African potato (*Hypoxis hemercallidea*) (Mohamed and Ojewole, 2003). It believed that the hypoglycaemic effect of the African potato extract might largely due to its phytosterol and/or sterolin contents; the extract mechanism of its hypoglycaemic action is still obscure and needs further investigation (Mohamed and Ojewole, 2003). A compound presumed to be an acidic glycoprotein, as it contained protein and sugar, is believed to be a hypoglycaemic principle in white-skinned sweet (Kusano et al., 2001). Oral administration of this aqueous extract of Africa potato (100 – 800 mg/kg of potato) produced maximal hypoglycaemic action in normal and diabetic rats. At a dose of 800 mg/kg of body weight African potato caused 30 per cent and 48 per cent reductions in the blood glucose concentrations of fasted normal and streptozotocin-induced diabetic rats. It was also found that short-term treatment with 4g/day of the extract of white-skinned sweet potato could improve metabolic control in type 2 diabetic patients by decreasing insulin resistance without affecting body weight, glucose effectiveness, or insulin dynamics (Ludvik et al., 2003). The lowest GI (Glycaemic Index) was seen in English potato

(34.3 compared with 159.9 of white rice) (Ayuo and Ettyang, 1996). It is suggested that type 2 diabetic patients should probably increase their consumption of low-glycaemic, high-fibre foods for their levels of glycosylated haemoglobin (HbA_1C) (Schafer et al., 2003).

There are also mixed herbal remedies that are claimed to possess hypoglycaemic effects. An example is, ginseng, a Chinese herbal remedy for diabetes, derived from the roots of several plants. One of the most commonly used and researched of the ginsengs is *Panax ginseng*, also called Asian or Korean ginseng (Kiefer and Pantuso, 2003). The main active components of *Panax ginseng* are ginsenosides, which have been shown to have a variety of beneficial effects, including anti-inflammatory, antioxidant, and anti-cancer effects (Kiefer and Pantuso, 2003). Results of clinical research studies demonstrate that *Panax ginseng* may improve psychological and immune functions, and conditions associated with diabetes (Kiefer and Pantuso, 2003). Dey et al. (2003) demonstrated and compared hypoglycaemic effects between ginseng root extract (150 mg/kg body weight) and ginseng berry extract (150 mg/kg body weight) in diabetic mice. Both forms of ginseng significantly decreased fasting blood glucose to 143±9.3 mg/dl (ginseng root extract) and 150±9.5 mg/dl (ginseng berry extract) on day 5. On day 12, although fasting blood glucose level did not continue to decrease in the group treated with root ginseng extract, the blood glucose level in ginseng berry treated group, became normoglycaemic (129±7.3mg/dl). Similarly, Sotanieme et al (1995) discovered that, ginseng (100 – 200 mg) elevated mood, improved psychological performance, and reduced fasting blood glucose and body weight in patients with type 2 diabetes (36 patients with type 2 diabetes in total). It was suggested that ginseng should be introduced as an adjunct in the management of type 2 diabetes (Sotanieme et al., 1995), and that *P. ginseng* berry extract may have therapeutic value in treating obese patients with diabetes (Xie et al., 2002).

It is also found that American ginseng (*Panax quinquefolius*), both root and berry extracts, possess hypoglycaemic properties (Vuksan et al., 2000; Xie et al., 2004). Studies discovered that American ginseng affects postprandial glycaemia in healthy and type 2 diabetic volunteers (Vuksan et al., 2000a; Vuksan et al., 2000b), and reduced hyperglycaemia in diabetic mice (Xie et al., 2004). The chemical constitutents of American ginseng that possess hypoglycaemic action were reported to be six major ginsenosides, i.e., Rb(1), Rb (2), Rc, Rd, and Rg(1) (Xie et al., 2004). In contrast, Vogler et al (1999) did not find any evidence for ginseng root extract to be effective for the treatment of diabetes, and urged that the efficacy and safety of ginseng as herbal remedy warrants more rigorous investigations. Moreover, use of ginseng may have potential drug-herb interactions (Miller, 1998). Consumption of ginseng could cause headache, and manic episodes in patients treated with phenelzine sulfate. It may also alter bleeding time and should not be taken with warfarin sodium and with estrogens or corticosteroids because of possible additive effects.

2. Plants with uncharacterised hypoglycaemic principles

This section reviews traditional anti-diabetic plants with have scientific and/or medical evaluation for a hypoglycaemic effect, although the active principles are unestablished.

Clinical research with maitake mushroom has increased dramatically in the past several years. In addition to cancer and HIV-infection studies, maitake mushroom has been reported to favourably influence hypertension and diabetes mellitus (Hobbs, 1995). Administration a water-soluble extract of maitake mushroom (140 mg/body weight) significantly lowered glucose concentration in diabetic mice within 8 – 12 hours and 16 – 18 hours (Manohar et al., 2002). Apart from a hypoglycaemic effect, maitake mushroom fraction could also improve the metabolic syndrome in aged diabetic rats (each experimental rat lost 16g body weight) and that consumption of 0.22 percent body weight of whole maitake powder could significantly reduce systolic blood pressure in diabetic rats (Talpur et al., 2002).

A daily consumption of *Bauhinia forficata* leaf decoction (150 g leaf/Litre water) for 1 month significantly reduced serum and urinary glucose, and improved carbohydrate metabolism in streptozotocin-induced diabetic rats (Pepato et al., 2002). Oral administration of *Bauhinia forficata* (500, 600 and 800 mg/kg after 1 and 2 hours) could also lead to a significant blood glucose lowering effect in both healthy and diabetic rats (Silva et al., 2002). The effect of 800 mg/kg *Bauhinia forficata* seemed last for long as 3 hours (Silva et al., 2002).

Administration plant remedies such as a decoction of dandelion (Cho et al., 2002) and an ether extract of *Lythrum salicaria* stem and flower (Lamela et al., 1986) decreased serum glucose concentration in experimented animals. Administration a decoction of dandelion to diabetic rats also improved lipid metabolism and could prevent diabetic complications from lipid peroxidation and free radicals in diabetic rats (Cho et al., 2002). An oral dose of 10 g/kg of ether extract of both *L. salicaria* stems and flowers reduced the elevated gamma-glutamyl transpeptidase activity induced by streptozotocin in rats, but only the stem extract that could also reduce the elevated lactic dehydrogenase activity (Lamela et al., 1986).

The use of *Phaseolus vulgaris* (harricot bean) as an alternative treatment for diabetes mellitus is common in Mexico (Roman-Ramos et al., 1991), and in India (Venkateswaran and Pari, 2002). A number of studies tested the effectiveness of an aqueous of harriot beans recently on experimental animals (Roman-Ramos et al., 1991; Venkateswaran and Pari, 2002; Venkateswaran et al., 2002; Pari and Venkateswaran 2003a; Pari and Venkateswaran, 2003b; Yokozawa et al., 2003). Oral administration of

200 mg/kg of aqueous extract of harricot bean pods to diabetic animals for 45 days resulted in a significant decrease in blood glucose, glycosylated haemoglobin, and a significant increase in total haemoglobin and plasma insulin (Pari and Venkateswaran, 2003b). Similar studies also found reduced the serum triglycerides, free fatty acids, phospholipids, total cholesterol, VLDL- and LDL- cholesterol (Venkateswaran et al., 2002); reduced glutathione, superoxide dismutase, catalase, glutathione peroxidase in the liver and kidneys of rats with streptozotocin-induced diabetes (Venkateswaran and Pari, 2002); and changed the structural and functional properties of collagen (the main protein constituent of white fibrous tissue) (Pari and Venkateswaran, 2003a). It suggested that the effect of this plant was more powerful than glibenclamide (hypoglycaemic tablet) (Venkateswaran and Pari, 2002; Pari and Venkateswaran, 2003b; Venkateswaran et al., 2002).

A number of vegetables rich in fibre are thought to be beneficial for the treatment of diabetes, notably green leaves of cabbage (*Brassica oleracea*), lettuce (*Letuca sativa*), potato (*Solanum tuberosum*), and turnip *(Brassica rapa)*. There is, however, only limited medical evidence and evaluation on cabbage (Platel and Srinivasan, 1997), turnip and lettuce. Green cabbage treatment enhanced glucose tolerance and lowered insulin immunoreactivity in plasma (Schafer and Haupt, 1980). The hypoglycaemic potency may partly due to their high fibre, complex carbohydrates and vitamins.

Zea mays (maize) used as a traditional treatment for diabetes in Europe, Africa, and the Americas, has been shown to contain a mineral-rich fraction with hypoglycaemic activity in rabbits (Farnsworth et al., 1971). In contrast, Feldman et al (1995) did not find an effect of maize fibre in glucose and insulin levels in people with type 2 diabetes. Segal et al. (1991) suggested that other cereal should replace refined maize as they found that maize elicited the highest glucose response (207 mmol/l/min) in healthy people, and maize and sugar elicited similar glycaemia (928 mmol/l/min and 921 mmmol/l/min) in diabetics. It believed that the high glucose response to maize could relate to its processing and physical form (Segal et al., 1991).

Xiaoke tea, a mixture of herbs, is consumed as a treatment for diabetes in China. The tea comprises a dark brown, very finely chopped preparation of dried plant materials that could not be identified botanically (Bailey et al., 1987). For the traditional use, an infusion is made by adding about 250 ml of boiling water to 3 – 4g of the dried tea. This is allowed to brew for several minutes or longer, and the fluid is consumed hot or cold. An aqueous extract of Xiaoke (1 g of dried plant preparation in 64 ml of water) reduced plasma glucose concentrations, polydipsia and hyperphagia of the streptozotocin induced-diabetic mice (Bailey et al., 1987). Xiaoke tea, however, failed to prevent the progression of severe hypoglycaemia and weight loss (Bailey et al., 1987).

Another type of tea prepared from *Syzygium cumini* (Jamun), also used by diabetics in Porto Alegre, Brazil and in India, might have an anti-hyperglycaemic effect in experimental animals (Teixeira et al., 1997; Prince et al., 1997). Oral administration of 2.5 and 5 g/kg of the aqueous extract of the *S. cumini* seed for 6 weeks to diabetic rats resulted in a significant reduction in blood glucose and an increase in total haemoglobin, although with a dose of 7.5 g/kg body weight the effect was not significant (Prince et al., 1997). In contrast, teas prepared from leaves and seeds of *S. cumini*, in concentrations ranging from 2 – 64 g/l, administered as a water substitute for 14 – 95 days, showed no detectable hypoglycaemic effect either in healthy or diabetic rats (Teixeira et al., 1997). The efficacy therefore, remains equivocal and rigorous medical and scientific evaluation is required before any recommendation for this plant as a treatment for diabetes.

ANTI-DIABETIC PLANTS: CAUSE FOR CONCERN

Approximately 80 per cent of the world's population does not have access to Western medicine and therefore depends on traditional medical plants and practices (Wagner and Farnsworth, 1990). Medicinal plants are also popular in the developed countries, being used by about 50 per cent of Australians (MacLennan et al., 1996), and 33 per cent of Americans (Johnston, 1997). In the UK the shelves of high street pharmacies, supermarkets and health food shops clearly illustrate the rapid growth in the herbal markets, with wider ranges of products on display. In 1993, over £60 million was spent on over-the counter unconventional therapeutic medicine in the UK, and the European herbal medicine market was worth £1.8 billion at retail selling prices (Consumers' Association, 1995). In Germany, herbal medicine has the highest forecast growth rates in Europe, (worth £1,400 million compared with £88 million in the UK) (Retail Business, 1996). Herbal medicines have become a popular form of therapy, and it is much more common among the well educated, the affluent, and women (Sharma, 1992). They are often perceived as being natural and therefore safe to utilise. This section reviews the recent literature on the adverse effects of some anti-diabetic medicinal plants, for example, toxic reactions, drug interactions and contaminants.

Although anti-diabetic plants are widely used around the world, toxicological information concerning traditional anti-diabetic plants is still limited. Use of the plants as regular constituents of diet might be expected to reveal any obviously detrimental side effects through the cumulative knowledge of personal experience (Bailey and Day, 1989). A study in South Africa recorded cases of fatal hypoglycaemia after consumption of unspecified medicinal plants and commonly found this to be associated with hepatic and renal necrosis (the death of some or all cells in kidneys) (Neame and Pillay, 1964). Some Indian herbal preparations contain material other than of vegetable origin and can lead to mercury and lead toxicity (Keen et al., 1994). A thirty-nine year old Indian man was admitted to hospital after 6 weeks of administration of a remedy purchased to treat his diabetes (Keen et al., 1994). The remedy, a pale brown powder, was found to contain 19 per cent by weight of lead. On examination he appeared unwell, clinically anaemic and pyrexial (fever) with blood pressure of 130/185 mmHg and a hepatitic condition (inflammation of the liver). A diabetic patient reported to the British Diabetic Association (BDA) that a shop in London was selling herbal tea said to cure diabetes (Gill et al., 1994). The drink cost in the region of £4 to £8 and when the patient had asked if this really cured diabetes, the 'doctor' who ran the shop confirmed that 'no more insulin' would be needed. The patient declined to try the treatment and there no details of the efficacy of the diabetic treatment were forthcoming.

Concurrent use of plants may mimic, magnify, or oppose the effects of drugs. Plausible cases of herb-drug interactions including bleeding when warfarin is combined with *Ginkgo biloba*, an anti-diabetic plant used in China (Rosenblatt and Mindel, 1997), and garlic (Burnham, 1995; German, 1995). Ginkgo alone has not been known to cause hypertension, but hypertension may occur if using this plant with a Thiazide diuretic (De Smet and D'Arcy, 1996). Similarly, Garlic possesses a number potential side effect including dermatitis, vomiting, diarrhoea, anorexia, flatulence, antiplatelet activity (Borins, 1998).

Induction of maniac depression (Jones and Runikis, 1987), or headache and tremor (Shader and Greeblatt, 1985) may occur in patients mixing *Panax ginseng* and antidepressants. Mixing neuroleptic drugs and betel nut (*Areca catechu*), an anti-diabetic fruit used commonly among Thais and Indo-Asians with diabetes, could exacerbate extrapyramidal effects (in the nervous system). Ginseng, a commonly used herb that seems to have many positive benefits, can potentially cause hypertension, diarrhoea, nervousness, depression, insomnia and skin rashes (Borins, 1998).

Use of *Momordica charantia* (karela) as an alternative treatment for diabetes is common among the British Indo-Asians with diabetes. Its juice has been shown to contain hepatotoxin causing injurious effects on liver cells (Tennekoon et al., 1994). A case study reported that hypoglycaemic effects of *M. charantia* was additive to that of chlorpropamide (Aslam and Stockley, 1979). Leatherdal et al (1981) discovered that karela decreased glucose concentration in blood, and it could cause extreme hypoglycaemic reactions if taken with other conventional hypoglycaemic agents.

Guar gum is another common anti-diabetic herb used in India. There have been 26 cases of severe adverse reactions associated with guar gum use: 18 cases of esophageal obstruction, 7 cases of small bowel obstruction, and one fatality (Lewis 1992). Guar gum could also decrease absorption of metformin (a hypoglycaemic drug) (De Smet and D'Arcy, 1996).

Increased bioavailability of aspirin could occur if taking this drug with tamarind (*Tamarindus indica*), an anti-diabetic plant used mainly in India and Thailand, (Mustapha et al., 1996).

WHY DO PEOPLE CHOOSE UNCONVENTIONAL THERAPEUTIC METHODS?

Users of unconventional therapeutic methods in other European countries share similar characteristics to British populations, which include belonging to professional, managerial, technical, business, academic and other non-manual work categories, with high educational background and with long-term chronic illness (Sharma, 1992). The characteristics of users of unconventional therapeutic methods in British Indo-Asian and Thai populations are, however different from those of users in many developed countries (Table 1). Sharma also suggests that people will only turn to non-orthodox treatments if they are suffering from chronic illness and/or long-term pain which orthodox treatment finds difficult to cure or has not been able to cure on terms which the patient accepts. Dissatisfaction with the orthodox treatment (Sharma, 1992) as well as accessibility (Minocha, 1980), are the main reasons for adopting unconventional therapeutic methods. Minocha concluded that Indian patients may prefer modern medicine, but what they actually use in the event of illness will depend chiefly on what is 'easily available' to them in terms of cost and location. Judith Lasker (1981) takes a similar view in her study of illness behaviour in the Ivory Coast. She suggested that people of Africa would only be convinced by 'scientific' medicine if they have had the opportunity to use it, i.e. they live near to where it is practised and can afford it, and not because of some prior ideological bias.

The literature on medical pluralism suggests also that decisions about treatment are not normally taken alone. There is a group of kin, or a 'therapy managing group' as Janzen (1978) calls it, which also tries to ensure that a sick person gets appropriate treatment. The influences of family and friendship networks were noted to have a considerable effect on the sick person's utilisation of medical services (McKinlay, 1973; Sharma, 1992). Beal (1976) believed that a process of consultation with the sick person's social networks (relatives and friends) is essential for identifying an appropriate healer in a particular case of illness. Those who are very young or very old, and vulnerable physically and/or mentally, are most likely to be influenced by their family's decisions or choices.

Sources of information, either 'public sources' (advertisements/Yellow pages; GP's recommendations and local associations/organisations) or 'private sources' (friends/

acquaintances/colleagues and relatives), play a major role in this decision making. Personal recommendation and reassurance increase confidence in usage of a particular healer. When faced with a doctor from a western culture, the average Asian patient, who is not sufficiently westernised, experiences a cultural barrier in both verbal and non-verbal communication. For example, an Asian woman would feel rather uneasy if she had to see a male doctor, as would as an Asian man if he were to be examined by a female doctor. Such basic cultural inhibitions pose a real dilemma and are, in part, the reason why some Indo-Asian patients will turn to a familiar, non-orthodox practitioner. In the hands of a doctor who tries to understand their culture and religion, they will feel confident Asians like to have faith in British medicine and, given a sympathetic and understanding approach, will be only too pleased to consult a western doctor. Another reason why patients may turn to a traditional healer has to do with the difference in the lay and medical concept of illnesses, which are embodied in the western approach to medicine.

However, usage of these unconventional therapeutic methods, among both Thai and British Indo-Asian users, is not normally admitted directly to the doctor. It is normally kept secret, as they believe that their orthodox doctors might not approve. This suggests that doctors should be more aware of unconventional therapeutic methods that their patients are likely to be using.

Table 1. Distinctions between the users of unconventional therapeutic methods in developed countries and developing countries (mainly the Indo-Asian and Thai users)

Distinction	Users in developed countries	Users in developing countries
Demographic information	- are mainly females - aged between 21 – 65 years old - with higher and middle socio-economic groups - with high educational background (Sharma,1992)	- both males and females - senior first generation of migrants - with low income, notably pensions/housekeepers (Greenhalgh, 1998)
Type of unconventional treatment used	- homeopathy and herbalism in female group - massage and osteopathy in male group (Sharma, 1992)	- at least 20 types of unconventional therapeutic methods are used depending on locality, cost, and availability (McAvoy et al., 1996)
Perception on diabetes mellitus	- higher understanding in diabetes and its complication	- low understanding in diabetes and its complication
Triggers to the use of unconventional therapeutic methods	- dissactisfaction with orthodox medicine and time receiving from the orthodox practitioners	- low income - low educational background - inaccessibility to medical services especially, among the British Indo-Asians with diabetes - lack of understanding - communication and language barriers

CHAPTER TWO

METHODOLOGY

This chapter reviews research methodologies, draws conclusions about the appropriate methodologies and research techniques applicable to studies in both parts: study 1 Use of medicinal plants for diabetes in Thailand and study 2 British Indo-Asians with diabetes: their adherence and use of medicinal plants, including ethical issues, and details of developments, pilot studies, reliabilities and amendment of the interview schedules in both studies. The method of data collection is outlined and a copy of the interview schedule referenced.

RESEARCH METHODOLOGY

This research focuses on the use of traditional medicinal plants as alternative medicine for diabetes mellitus, in adults of Asian origin. Study 1 focuses on people living in Thailand and Study 2 focuses on those living in the UK. The use of medicinal plants is frequent in both countries. Among British Indo-Asians with diabetes, the medicinal plants used are mostly imported from back home (India, Pakistan and Bangladesh), and therefore tend to be expensive to purchase in the UK.

The followings are questions posed.

1. *Who are users of the medicinal plants?*
2. *What characteristics distinguish users from non-users?*
3. *What medicinal plants are used?*
4. *What factors prompt the initial use of medicinal plants?*
5. *Does using medicinal plants associate with dissatisfaction towards conventional treatments, medication or services provided by NHS?*
6. *Does using medicinal plants have an effect on adherence to conventional treatment regimes?*

Self-administered questionnaire or Structured interview?

The nature of the issues in this research strongly suggests that a quantitative rather than qualitative methodology should be used. Data on the use of no conventional medicines are typically absent from medical records, and direct observation of relevant aspects of people's behaviour is practical, a questionnaire-based methodology was used.

Questionnaires are documents designed with the purpose of seeking specific information from the respondents (Polgar and Thomas, 1995). They are frequently used for data collection in health science research. Good questions are hard to write (Abramson and Abramson, 1999). It requires skill and experience (or even expert advice), careful thought, and practical testing (Fink, 1995; Fowler, 1995; Kornhauser and Sheatsley, 1979; Payne, 1965; Converse and Presser, 1986; Sudman and Bradburn, 1983). The answers they elicit may vary widely, depending on how the questions are constructed and worded and the level of participants' literacy. The design of a questionnaire is, therefore, very crucial to its success.

Five careful steps are involved in constructing a questionnaire.

1. Defining the information that is being sought. The information comes from the investigator's research objectives, discussion with others, reading and other sources. At this stage, the document is typically a list of information yet to be translated into specific question form.
2. Drafting of the questionnaire. The overall design of the questionnaire is important for the validity of the obtained information. The researcher must be careful to avoid using *double-barrelled questions* ("Do you like maths or science?", for example), *ambiguous questions* that may mean different things to different people, *bias and/or leading questions* which could lead the respondent to feel committed to respond in a certain way, *sensitive questions* which could lead the respondent to feeling embarrassed or offended. It is also very important to tailor the level of wording of questions to accord with the intended respondents.
3. Questionnaire pilot. A pilot study is crucially useful as it establishes whether or not the questions are appropriate to the potential research samples. As it was said by Sudman and Bradburn (1983) "*If you do not have the resources to pilot-test your questionnaire, don't do the study.*"
4. Redrafting of the questionnaire. All problems with the questions should and must be rectified at this stage. After modification, it is wise to repeat the pilot study before the administration of the questionnaire to the full sample of respondents (Polgar and Thomas, 1995).
5. Administration of the questionnaires.

There are two formats for administering questionnaires: the face-to-face interview and the self-administrated questionnaire.

An interview is a conversation between interviewers and interviewees with the purpose of eliciting certain information. Interviews are another key tool for the clinician and the health researcher as a means of collecting information.

It is very useful to consider some of the advantages and disadvantages of the different types of interview approaches. These are summarised in table 2.1.

Table 2.1. Advantages and disadvantages of structured and unstructured interview (Polgar and Thomas, 1995)

	Advantages	Disadvantages
Structured interviews	• may be less time consuming • the same information is collected for all respondents	• responses may not be recorded in the respondents' own words
Unstructured interviews	• responses may be recoded in the 'own words' of the respondents, hence less bias through interpretation • the respondent has some input into the research agenda	• may be time Consuming • not all the same information is collected for all respondents

As outlined in table 2.1, unstructured interviews least suited both studies in this research as this approach is qualitative rather than quantitative.

The choice between a self-administered questionnaire and a highly structured interview may not be an easy one. The use of a self-administered questionnaire is simpler and cheaper; such questionnaires can be administered to many persons simultaneously and, unlike an interview, can be sent by post. On the other hand, they demand a certain level of education and skill on the part of the respondents; people of low socio-economic status are said to be less likely to respond to a mailed questionnaire (Abramson and Abramson, 1999). Rejections or refusal rates can be high, and control over how the response forms are filled out is limited. Non-return, or the return of incomplete or uncompleted forms, is inevitably considerable. Therefore self-administered questionnaires may be more likely to introduce errors. However, self-administered questionnaires are commonly and successfully used, and appear to be better for some purposes (Grootendorset et al., 1997), typically in relation to sensitivity issues such as disability, pain and emotional disturbances, sexual partners and sexually transmitted diseases.

Face-to-face interviews have many advantages. It is suggested that a good interviewer can motivate and maintain the respondent's interest, and can also create an atmosphere conductive to the answering of questions (Bowling, 1997). It can be applied to all educational levels or attainment. If a question is not understood an interviewer can repeat it and, if necessary, provide an explanation or alternative wording. Furthermore, an observation can be made in the face-to-face interview and the interviewer can also use visual aids to help explain a particular word or situation.

Nevertheless, there are also disadvantages. Face-to face interviews are expensive as they are time consuming and a skilful interviewer is required. Moreover, errors can occur, as with a self-administered questionnaire, if the interviewer is not skilful and careful.

Polgar and Thomas (1995) distinguished costs and benefits of interview and self-administrated questionnaires as in table 2.2.

Table 2.2. Costs and benefits of interviews and self-administered questionnaires (Polgar and Thomas, 1995)

	Costs	Benefits
Interview schedule administered by interviewer	• expensive to administer • requires expert help susceptible to interviewer bias	• lower rejection rate • more detailed responses • can be elicited greater control over filling out of response form
Self-administered questionnaire	• high rejection rate difficult to elicit detailed responses • less control over how response form is filled out	• cheap to administer • less susceptible to interviewer bias can be administered

The disadvantages outlined in table 2.2, and the characteristics of potential participant (majority from low economic and educational background), suggested that the self-administered questionnaire is the less suitable alternative for this research.

The questions may be *open-ended (or 'free response')*, in which the respondent answers in his/her own words, or *closed (or 'fixed-alternative')*, which are answered by choosing from a number of fixed alternative responses. The advantages and disadvantages of both question types are presented in table 2.3.

Table 2.3. Costs and benefits of open-ended and closed-ended response formats (Polgar and Thomas, 1995)

	Costs	Benefits
Open-ended	• less structured • responses difficult to encode and analyse using powerful statistical methods • long time taken by respondent to answer • respondent may find writing an essay more difficult than circling a number	• more detailed answer elicited
Closed response	• less 'depth' in answers may frustrate respondent	• tightly structured • responses easily encoded and analysed • less time taken to collect responses

Close-ended questions seem to be more appropriate to this research. The data collected are well suited to quantitative analysis.

Ethical issues

Ethical considerations indicate an honest and clear explanation of the purposes and details of the study should be given to all participants. This includes their right to refuse to answer questions or withdraw from the interview. Ethical issues were dealt with fairly informally in study 1 where a study was taken part in Thailand. Approval from a general meeting among the directors and the diabetologist of the local hospital was required. In contrast much more formed procedures are in place in the UK. Approval from a formally constituted medical ethics committee is required. Thus the study in study 2 was forwarded to a local Ethics Committee (Coventry Research Ethic Committee) for approval, and was approved on 29th August 2000 (see a covering letter in Appendix I).

Blaxter, Hughes and Tight (1996) summarised ethical issues under four headings: (1) Confidentiality, (2) Anonymity, (3) Legality and (4) Professionalism. All were explicitly addressed in the design of both parts of this study.

1. Confidentiality

Ground rules were established with the participating organisations (general medical practices) about how feedback (if asked for) would be given. Agreement was reached that the names of individuals would not be revealed. It was stressed to all respondents that any confidential comments they may make would not be revealed to any third party, and that results would be presented in a way that did not reveal the identity of any individual participants.

2. *Anonymity*

The rules of anonymity were made clear to all respondents and strictly adhered to. The interview schedule was design to ensure that no reference would be made to the person's name, address or a contact number.

3. *Legality*

The nature of this study did not require any access to the participants' confidential records kept by their general practices. The interview schedule was checked to ensure that it did not encourage respondents to contravene any organisational codes or rules of morality, ethics or general probity.

4. *Professionalism*

No one was forced into completing an interview schedule against his or her wishes. This was agreed with the local participating agents and only reasonable encouragement to respond was given.

DEVELOPMENT OF THE INTERVIEW SCHEDULES

This section discusses the adoption of evaluated and well-known scales in study 1, and the development and the redesign of the interview schedules for study 2. In study 1, a set of well-known and evaluated questionnaires in Clare Bradley's book (1996) were selected to assess satisfaction with western medication and treatments, and participants' knowledge of diabetes. This was the first time these characteristics had been measured in Thai diabetics. In study 2, a number of re-modified scales were introduced to measure: treatment satisfaction, basic diabetes knowledge, and self-care behaviour and adherence. Rationales and evaluations for these modifications are also addressed here in detail.

Study 1. Use of medicinal plants for diabetes mellitus in Thailand

The first section in this interview-schedule began with demographic questions, and questions about treatment and the use of medicinal plants or herbs for the participants' diabetes. Questions regarding the year of birth, height and weight were asked using an open-ended format. Other demographic questions, for example, marital status, religion, occupation, monthly income and educational background are preferably asked with a closed-ended question (Abramson and Abramson, 1999), so the interviewees were asked to choose one of a number of responses. Where options for response coding included banding, i.e. income per month, care was taken to make these strictly mutually exclusive such as 3,001-5,000 Bahts, 5,001-7,000 Bahts (rather than 3,000-5,000 Bahts, 5,000-7,000 Bahts).

For assessments of psychological status, three validated scales in Bradley's Handbook of Psychology and Diabetes (Bradley, 1996) were adapted: (1) The diabetes treatment satisfaction questionnaire, (2) the ATT19 Diabetes integration scale; and (3) the Diabetes Knowledge (DKN) questionnaire.

1. **The Diabetes Treatment Satisfaction (DTSQ)** was designed by Bradley (1996) to measure satisfaction with treatment regimens in people with diabetes. It was said to be suitable for both type 1 and type 2 diabetic patients. The original DTSQ was designed to assess changes in satisfaction with changes in treatment regimen and the present form is considered to be appropriate for comparing satisfaction levels in patients using different treatment regimens (Bradley, 1996), but not to measure satisfaction with other aspects of the diabetes care service. The scale contains eight items. The score on each item can range from 0 (very dissatisfied) to 6 (very satisfied). Items 1, 4, 5, 6, 7 and 8 are summed so that total scores can range from 0 to 36. The remaining two items: 2 and 3 need to be treated individually. Item 2 provides an indication of perceived frequency of hyperglycaemia on a scale ranging from 0 "none of the time" to 6 "most of the time". Item 3 provides an indication of perceived frequency of hypoglycaemia on a scale ranging from 0 "none of the time" to 6 "most of the time".

2. **The ATT19 (Diabetes integration) scale** is a new revised form of the ATT39 used to measure psychological adjustment to diabetes. The ATT39 is a measurement of psychological adjustment that was developed by Dunn and colleagues (1986), in response to the needs for more specific measurement tools for the assessment of

psychological issues in diabetes (Bradley, 1996). It, however, appears to be relatively lengthily. It was, therefore abolished from this study and was then replaced by a revised scale - ATT19, which is shorter and potentially more reliable and practical for clinical use (Welch et al., 1996). The ATT19 items are scored on a five-point Likert scale ranging from "I disagree completely" scored "1" through to "I agree completely" scored "5", except for items 11, 15 and 18 being reversed scored. Raw scores on the nineteen-items are summed to produce a total score ranging from 19 to 95. This measure is considered to be useful for both IDDM and NIDDM patients.

The validity, reliability and usefulness of the ATT19 was assessed and explored, in a joint study between Australia and New Zealand, by Welch and his colleagues (1992). Despite the ATT19 being about half the length of the original one (ATT39), its reliability is high compared to the ATT39. It was found that low scores on the ATT19 were associated with resentment, embarrassment, anxiousness, helplessness, isolation and poor adjustment to having diabetes, while high scores were associated with acceptance to and having comfortable feelings with diabetes. The latter group would be calmer, have higher sense of self-control and feeling well adjusted to their diabetes. It was also showed that the ATT19 significantly and positively correlated with diabetes knowledge, and patients with complications had significantly poorer (lower) scores than a group without complications.

3. **The Diabetes Knowledge** (DKN) scales were developed by Linda, Beeney and colleagues during the late 1970s and early 1980s in response to the need for a short theoretically-based knowledge test (Beeney, et al., 1996). It met psychometric criteria of reliability and validity, and had practical advantages in being short and easily administered. There were three parallel versions: A to C. The scales were developed for

use with people with diabetes, particularly in situations where knowledge needs to be assessed quickly, reliably, and repeatedly in programme evaluation and research. It was designed for both IDDM and NIDDM patients, teenagers to the elderly, and was used in a variety of ethnic groups. Each scale contains fifteen questions mixing both theoretical and practical knowledge and concentrates on five broad categories:

A. basic physiology of diabetes including insulin action;

B. hypoglycaemia;

C. food groups and food substitutes;

D. sick day management;

E. general diabetes care.

It uses a multiple-choice format. Each item is assigned a score of 1 for a correct response and 0 for an incorrect response. Items 1 to 12 on each form require a single correct answer, while for items 13 to 15 several answers are correct and all must be checked to obtain a score of 1.

The total score is calculated by summing the scores on each of the fifteen items, to give a potential score in the range of 0 to 15, with higher scores indicating better diabetes knowledge.

Translations and usage of Scales

A Thai lady who is very fluent in English language translated the three scales into Thai language. The questions in Thai were then back-translated into English by another translator who was a native speaker of Thai language, and had never seen the original forms before. The back-translations were then compared with the original to identify any linguistic inaccuracies.

The interview schedules were produced in clear printing to ensure that questions were very easy to understand. They were then piloted with 8 Thai postgraduate students in the UK. Evaluation of each scale is discussed in more detail below.

Reliability of scales used in study 1

Welch and colleagues' Diabetes integration (ATT19), Clare Bradley's DTSQ scale and Linda and colleagues' DKN scale were selected for a study in Thailand. In pilot study A, these three scales (in English version) were tested with 24 UK adults with diabetes (gender: 13 males, 11 females; country of birth: 8 UK, 4 India, 9 Pakistan and 3 Bangladesh; all Asian participants preferred to be interviewed in English). In pilot study B, the same scales translated into Thai language were tested with 8 Thai people with diabetes living in the UK (gender: 4 males, 4 females, 6 of whom derived from a higher educational background – universities in the UK).

Psychological scales: ATT39 and ATT19

Both ATT19 scales (Thai and English versions) had relatively high alpha coefficients (Table 2.4) in pilot studies A and B. Although raw scores in items 11, 15 and 18 were reversed as suggested (Welch et al., 1996), corrected item-total correlation of items 1, 4, 11, 12, 15, and 18 in the English version (Pilot study-A) were relatively low (between -.34 and .11) compared with the remaining items in ATT19. This suggested that these items could be deleted and may not be appropriate with a sample in a subsequent study 2.

However, it seemed appropriate at the time to use ATT19 with a sample in Thailand because of the widespread acceptance of Bradley's scales, the brevity of the ATT19 and the small size of the pilot studies.

Table 2.4. Reliability of ATT19, DTSQ and DKN scales

Scale	Pilot study	Number of items	Scale mean	Scale SD	Alpha
ATT19	A (8 Thais)	19	56.75	12.10	.80
	B (24 English and Asians)	19	53.50	13.92	.84
DTSQ	A (8 Thais)	6	19.75	4.95	.80
	B (24 English and Asians)	6	20.79	4.13	.56
DTSQ-item 2	A (8 Thais)	1	2.87	1.95	
	B (24 English and Asians)	1	2.79	1.47	
DTSQ-item 3	A (8 Thais)	1	3.63	1.40	
	B (24 English and Asians)	1	2.80	1.58	
DKN	A (8 Thais)	15	10	3.25	.70
	B (24 English and Asians)	15	6.54	2.94	.60

DTSQ (The Diabetes Treatment Satisfaction Questionnaire)

As suggested by the scale developer (Bradley, 1996), scoring and measuring the reliability of the DTSQ are to be carried out in three different parts. Items to be summed are 1, 4, 5, 6, 7 and 8. Scores can range from 0 (very dissatisfied) to 36 (very satisfied). The remaining two items (2 and 3) are treated individually. As shown in table 2.4, the cronbach's alpha in a pilot study-A was relatively low when compared with a pilot study –B. However, a majority of participants in both pilot studies, notably among those using more than one form of treatments (i.e. those using insulin injection and diabetes tablets) to treat their diabetes indicated that these items, and especially the words *'current treatment'* are vague and indistinctive. Those who found insulin injection(s) difficult and inconvenient to carry out but found diabetes tablets were acceptably easy to take, were unable to specify these two issues separately. It was thought that this difficulty the samples experienced might interfere with the way they responded to these items. Many also found items 2 and 3 to be too complex. This could be that it is too elaborate for the majority of samples who had limited formal education and who were unfamiliar with answering the questions or rating their experiences of hypo- and hyperglycaemia on a rating scale.

As the reliability of DTSQ scale seemed relative high in the pilot study-B, it was judged appropriate that this scale was to be selected and used in a study in Thailand.

DKN (Diabetes Knowledge)

The coefficient alpha for the DKN among 8 Thai participants was higher than the coefficient alpha of DKN in 24 English and Asian samples (Table 2.4). The DKN seemed easy for many Thai participants. This could be that the majority of the Thai samples were derived from a higher education group when compared with many participants in English and Asian sample. Patients with more formal education read more or absorb and retain information better from diabetes literature and from professional's advice than those with less or no formal education. Maxwell (1992) reported a positive correlation between education and DKN score (r = 0.41). Beeney and colleagues (1996) also reported that patients with more diabetes education tended to have higher DKN scores.

Thus a pilot of DKN with eight Thai participants suggested it was reliable, and that the DKN is useful in study 1. It is, however, unrealistic to assume that this piloted group characterised the potential target group in Thailand. Thailand is a developing country, a high proportion of people living in poverty and those with low or no formal education are the main issues of concern for the revolution within this country. However, the measurement of diabetes knowledge remains importance to this research. This scale can be used to evaluate and screen groups and individuals for their level of understanding of diabetes, which might be linked with usage of unconventional therapeutic methods, in this case a use of medicinal plants.

Study 2. British Indo-Asians diabetics: their adherence and use of medicinal plants for diabetes mellitus

This study concerns usage of medicinal plants for diabetes mellitus and adherence among the British Indo-Asians with diabetes. The literature review (see chapter four – study 2) indicated that before any improvements in health care facilities should be made to suit individual's needs and for non-adherence to be overcome, a team of health care providers needs to understand that an individual's health belief can be influenced by:

- individual characteristics (such as age, gender, size, appearance, personality and experience of life);

- education (both formal and informal, including education into religious, professional or ethnic sub-culture);
- social aspects (such as social class, economic status, and social pressure or support from other people);
- culture (including the culture into which he or she was born, and that which now surrounds him or her).

Health beliefs are often complex and multicausal, and tend to change over time, depending on circumstances (Helman, 1987). They are important since they help determine how patients interpret their ill-health, and what they think should be done about it.

Cultural background is one of many factors that influence patient's health beliefs, as well as those of his/her health professionals. McAvoy and Donaldson (1990) simply described culture as "an inherited *lens* of shared concepts and rules of meanings through which the members of a group perceive the world they live in, and which guides their behaviour in their daily lives, and influences emotional reaction to it". Culture is therefore, a factor which will influence an individual's beliefs, behaviours, perceptions, language, religion, family structure, diet, dress, body image, attitudes, ill-health, pain, and other forms of misfortune. All of those may have important implications for health and health care.

The ways an individual may or may not adhere to medical advice can be influenced by factors such as:

- his/her characteristics or demographic factors;

- treatment and disease characteristics;
- provider's characteristics;
- relationship between patient and doctor;
- patient's limitation and understanding;
- patient's perceptions, beliefs;
- social support;
- patient's expectations;
- patient's past behaviour and experience.

Patients may turn to another source of treatment (alternative medicine) and/or healers because of factors such as:

- dissatisfaction with orthodox medication;
- dissatisfaction with orthodox doctors and their advice;
- dissatisfaction with orthodox arrangements such as a long waiting list and short visits;
- desperation to be cured;
- influences from family and friends;
- cost of treatments, particularly, in many 3rd world countries where medications are not free;
- patient's characteristics (age, gender, size, social status, education...);
- patient's perceptions, expectations and beliefs (mainly influenced by culture);
- patient's preferences (preferring to be seen by a female doctor, for example);
- type of illness or disease they are encountering (mainly, chronic illnesses);
- language barriers for example between an Asian patient and an English doctor).

Questions were drafted that addressed these specific issues. In this way the extent to which respondents recognised these factors could be assessed.

The questions were initially piloted with a small group (25 participants) whose characteristics are similar to those of the potential samples. After initial rectifications and modifications were made, the questions were piloted again to a different group with slightly more numbers (27 participants), but with similar characteristics.

Responses from the pilot studies were analysed and as a result several amendments were made. These are discussed in more detail in a section called Reliability of Redesigned Scales.

An Asian translator fluent in several Asian languages translated the questions into two languages (Punjabi and Pakistani). The questions in Punjabi and Pakistani were then back-translated into English by other translators who were native speakers of that language (Punjabi or Pakistani). Neither had seen the original forms before. The back-translations were then compared with the original to identify any linguistic inaccuracies.

One amendment was made with both languages, mostly linked with words that could have several meanings to different people. An agreement was made between the initial translator, the second translator and a researcher that the use of a word closer in meaning to the original form (Bradley, 1996) would be used. This was to ensure that the meaning would be clearly understood by the majority of interviewees (Punjabis and Pakistanis).

Physical lay out of interview schedule

The Pakistani and English interview schedules were produced in clear printing to ensure that questions were very easy to understand. The Punjabi form was, however, produced in hand writing form; an independent translator checked that it was easy to read and accurately written. The independent Punjabi translator who checked both original and back-translated forms was employed to do the interviews in both languages (Punjabi and Pakistani). Confidentiality and anonymity were stressed at the outset of each interview schedule. The structured form of the questionnaire ensured that it naturally flowed from one question to the next.

Questions were uniquely identified by codes for section, number etc. There were mainly associated with questions requiring number responses, for example the year born, number of years with the disease...(requiring interviewees to enter number of their own choice), closed (requiring the interviewees to choose from a selection of options offered to them) or dichotomous (requiring selection from a 'yes/no' option). Interviewees were given a full choice of responses including *undecided* and *not known*.

The option of *other - please state* was offered where interviewees were, for example, asked to state their current employment status. Responses marked *other* very commonly fail to supply the specific information requested (Dengler, 1997), but as this research was carried out by using a *face-to-face* interview technique the problem could be overcome by prompting.

Where options for response included banding (e.g. income/month) they were made mutually exclusive such as £1 - £500, £501 - £1,000 and not £1 - £500, £500 - £1,000 so that a person whose income was £500 did not have an ambiguous choice.

Notes to interviewers, for example, **[Q7 is for answer 2. 'Diet plus tablets']** were made explicit and, they were all taught the meanings of some codes, e.g. **Q7 means Question number 7**, and trained before the actual interviews took place.

Likert scales

Attitudes are commonly assed by Likert scales. In Likert scales, a statement is provided, and participants have to rate the extent to which they agree with that statement on a scale form strongly agree to strongly disagree. Two possible response formats are commonly used, a five point scale (Welch et al., 1996) or a seven point scale (Lewis and Bradley, 1996) These a five point scale would be: strongly agree$_{(1)}$ agree$_{(2)}$ undecided$_{(3)}$ disagree$_{(4)}$ strong disagree$_{(5)}$.

Likert-scales typically have an odd number of response options which allows middle '*undecided*' response. It is also possible to have an even number of response options, for example, strongly agree$_{(1)}$ agree$_{(2)}$ disagree$_{(3)}$ strongly disagree$_{(4)}$, which does not have '*undecided*' response, and so forces respondents to either a positive or a negative response. This reduces mere tendency toward acquiescence to a 'middle ground' response, might remove the possibility of expressing a true middle ground attitude.

For analysis, responses were assigned a value from 1 to 5 (on a five-point scale), for example, assigning '1' to the response that is deemed to be the least desirable as an answer to the question being asked. Responses are therefore quantitative, and can be examined using suitable statistical procedures. This is the strength of using Likert scales.

However, there are also weak points of using Likert scales: (1) each respondent's response can only have meaning relative to the responses to that questions and, (2) a mid-score becomes ambiguous in that the respondent may have wanted to express *not known* or wanted to indicate that they *had no opinion*.

The face-to-face interview method ensured that respondents did not become bored. As mentioned earlier, a good interviewer can stimulate and maintain the interviewees' interests and can create a rapport and atmosphere conducive to the answering of questions.

New designed scales

Due to some failures in study 1 in Thailand (see chapter three), four newly designed scales were introduced (PAD16, TSF16, Self Care Activities and BDKQ28). These scales, in both English and Asian languages, were piloted twice before the actual study took place. The first was Pilot study C with 25 volunteers (15 males and 10 females; 8 English- and 17 Asian-born: 4 Indians, 9 Pakistanis and 4 Bangladeshis; control of diabetes: 72% were treated with tablets, 8% with insulin injections and 20% with both insulin injections and tablets; level of education: almost half (44%) had more than 5 years at school) living in Oxfordshire and Rugby areas. The second was Pilot study D with 27 volunteers (gender: 15 males and 12 females; country of birth: 9 English- and 18 Asian-born: 4 Indians, 9 Pakistanis, 4 Bangladeshis and 1 Indian-Malay; control of diabetes: 70% were treated with tablets, 11% with insulin and 19% with tablets and insulin injection; level of education: 56 % had more than 5 years at school and 26% had a university degree) living in Oxfordshire and around Foleshill and Birmingham areas. The participants in both piloted groups were similar in terms of treatment.

Modifications were made after the pilot study C was carried out, many of which were associated with translation errors. It was then followed by the second pilot study (D) to ensure that these scales were reliable for the main study.

PAD16 (Psychological Adjustment to Diabetes)

Originally, PAD consisted of 17 items. However, when this scale was tested with 25 participants in the pilot study C, item 17 – "I like people knowing that I have diabetes" appeared to have the lowest corrected item-total correlation (.5) when compared with the remaining items. Item 17 was, therefore deleted. The new PAD16 scale comprises sixteen different attitudinal statements relating to a patient's perception of diabetes, developed specifically for study 2. It is slightly different and shorter version than Bradley's ATT19 (1996) that was used to assess psychological attitudes of people with diabetes in Thailand (study 1 - a 'Preliminary study'). Based on a similar principal to Welch's ATT19, the PAD16 contained five psychological concepts: coping, convicted feelings, uncertain feelings, guilt and diabetes stress, but not alienation – cooperation. ATT19 as a whole scale was considered very reliable for the sample in Thailand (cronbach's alpha = .95), but alienation-cooperation items such as items: 4, 16, 17 and 18 had lower corrected-item total correlation when compared with the remaining items (.39, -.06, .28, .37). Importantly, the PAD16 scale is a more user friendly to both the interviewer and interviewee than ATT19. Raw scores for items (1, 9, 12 and 13) are reversed from the rest of the scale. The scores on sixteen items are summed to produce a total score that ranges from 16 to 80. Participants with high scores on the PAD16 would be resentful, embarrassed, anxious, helpless, isolated and find it difficult to adjust to having diabetes. Whereas, those scoring low would be accepting of their diabetes, comfortable with public awareness of their diabetes, be calm, have a sense of self-control and feel well adjusted to their diabetes.

The PAD16 had a high degree of internal consistency with an alpha coefficient of .90 when assessed with Cronbach's alpha coefficient in a pilot study D of 27 English and Asian participants (Table 2.5).

Table 2.5. Reliability of PAD16, TSF16 , Self-care activities scale and BDKQ-28

Pilot study	Scale	Number of items	Scale mean	Scale SD	Alpha
C (25 English and Asians with diabetes)	**PAD17**	17	67.04	17.87	.94
D (27 English and Asians with diabetes)	**PAD16**	16	64.92	17.31	.98
C (25 English and Asians with diabetes)	**TSF16**	16	45.12	9.65	.79
D (27 English and Asians with diabetes)	**TSF16**	16	44.69	9.71	.78
C (25 English and Asians with diabetes)	**Self care - tablets**	6	20.37	3.11	.92
	Self care – insulin	3	8.01	2.49	.69
	Self care - diet	3	11.84	5.43	.94
	Self care - exercise	1	3.56	2.31	
	Self care – blood testing	1	4.00	2.63	
	Self care - appointments	1	3.96	.20	

Table 2.5. Reliability of PAD16, TSF16 , Self-care activities scale and BDKQ-28 (continued)

Pilot study	Scale	Number of items	Scale mean	Scale SD	Alpha
D (27 English and Asians with diabetes)	Self care - tablets	6	20.37	3.11	.92
	Self care – insulin	3	8.37	2.61	.70
	Self care - diet	3	11.80	5.32	.94
	Self care - exercise	1	3.40	2.01	
	Self care – blood testing	1	4.11	2.59	
	Self care - appointments	1	3.81	.62	
C (25 English and Asians with diabetes)	BDKQ-28	28	11.72	4.09	.70
D (27 English and Asians with diabetes)	BDKQ-28	28	12.27	4.89	.79

TSF16 (Treatment Satisfaction)

Bradley's (1996) treatment satisfaction scale (DSTQ) of was found unsatisfactory in study 1 - Thailand study (Cronbach's alpha = .56). Thus TSF16 was developed particularly for a sample within this study 2 (British Indo-Asians). It is longer than the DTSQ as it covers more issues including satisfaction and dissatisfaction with: treatment; understanding of diabetes; the health care team, adequacy of care, medical advice and information; communication; and health care facilities. All of the factors might be contributors to use of unconventional therapeutic methods, e.g. a use of medicinal plants. It was found to be a useful tool to assess samples from an ethnic minority background. This made it easier for an interviewee to specify his/her answer on such scale.

The DTSQ scale of Bradley (1996) includes questions concerning hypo- and hyperglycaemia (item 2 and 3). These items was designed to evaluate blood glucose control which would be useful for clinical assessment, assuming patients being interviewed tested their blood glucose regularly. Unfortunately, this was not the case with the sample in pilot study A. Half of volunteers, mainly those using tablets to treat diabetes, did not test their blood glucose on a regular basis, which made it impossible for them to report the perceived hypo- and hyperglycaemia. Many older participants, especially in pilot study A (study 1) also commented that these two items were too complex, as they found it difficult to express their feelings on this type of likert scale. They thought it would be friendlier if this were worded rather than numbered. Through these issues and criticisms, it was decided that measures of perceived hypo- and hyperglycaemia were not to be included in TSF16 scale.

The TSF16 was found to be internally reliable in both pilot studies: C and D with an approximate alpha coefficient of .80 (Table 2.5).

Self-care behaviour

There is great concern about diabetes self-management, for example adjusting to healthy lifestyle, as it can in turn prevent acute and long-term complications of the disease. It is thought that diabetes self-care and level of diabetes control as well as psychological factors may be predictive of self-care (Goodall and Halford, 1991), and that a reliable self-care behaviour assessment aids adherence evaluation (Toobert and Glasgow, 1991). This study investigated the link between self-care behaviour and adherence, which in turn may be predictive of the usage of unconventional therapeutic methods such as medicinal plants. Based on the similar approaches and principals to the scale - Diabetes Self-Care Activities of Toobert and Glasgow (1991), the newly designed self-care behaviour/activity scale was introduced particularly for this study. Slightly more in depth than Toobert and Glasgow's scale (1991), this scale contains 9 questions concerning an individual's self-care behaviour. The new designed self-care behaviour/activity scale comprises 3 separate sections: (1) adherence to diet, exercise, and blood tests; (2) perception of medication acceptance; and (3) attending diabetes clinic appointments. To eliminate the complexity for people who might be using more than one form of treatment, a treatment was therefore available in a separate group (see Self Care Activity (SCA) in Appendix I). This tool was also made to be culturally sensitive to ethnic minority people with diabetes, especially questions concerning diets (see Self Care Activity (SCA) in Appendix I). Different types of typical international names and food dishes could be included according to the sample's ethnicity. In this study, to make questions more appropriate for to the target sample, most familiar Asian ingredients, dishes, sweets and fruits were included. It was believed that these diets contain similar or may be more fat constituents than many typically unhealthy English foods.

Self-care behaviour/activity, as a whole scale, could not tested for its reliability as some parts, for example, exercise; blood testing and diabetes clinic attendance contains a single item. For results see Table 2.5.

BDKQ-28 (Basic Diabetes Knowledge Questions)

The BDKQ-28 is a diabetes knowledge scale. It contains twenty-eight questions, designed to sample knowledge in six broad domains.

1. Basic knowledge about diabetes including symptoms and signs of stress;
2. Management of diabetes including food types and consumption, exercise and blood testing;
3. Understanding the need for regular medical check-ups for signs of complications;
4. Knowledge of risk factors including smoking and alcohol intake;
5. Knowledge of hypoglycaemia and glycaemic levels;
6. Understanding the implications of blood pressure.

The BDKQ-28 was developed because of a lack of success with Beeney's et al (1996) DKN in study 1 in Thailand. In this study, the alpha of fifteen items on DKN was .64 (see chapter three). Nine out of fifteen items (items: 1, 2, 3, 10, 11, 12, 13, 14 and 15) showed very low corrected item-total correlations (less than .3).

The failure of the DKN may be largely attributed to an extreme lack of knowledge on diabetes of the Thai sample. Many Thai participants did not know what 'insulin' or 'ketone' were, and could not link protein with any of their typical dishes. Moreover, it was believed that many questions in DKN were unsuitable for the majority of people with diabetes in Thailand. In Thailand, margarine or butter is simply not commonly used in typical Thai dishes, and many older participants, in a Preliminary Study simply did not know what they were.

The two versions (English and Asian languages) were piloted twice in pilot study C and pilot study D (see Table 2.5). Due to translation errors, the corrected-item total correlation for question 3 and 21 in pilot study-C was found to be lower than the remaining questions (-.013 and -.016). However, the values of corrected-item total correlation of the two questions and the whole scale coefficient alpha improved after a rectification in pilot study D (see Table 2.5).

CHAPTER THREE

STUDY 1. USE OF MEDICINAL PLANTS FOR DIABETES MELLITUS IN THAILAND

SUMMARY

Diabetes mellitus affects 11.8 percent of the whole population of Chai Nat province, Thailand. The predominant type of diabetes is non-insulin dependent diabetes mellitus (NIDDM). It is most frequently found in old and overweight female patients. Use of herbal remedies from medicinal plants was studied in a sample of 200 people with diabetes attending the major hospital of Chai Nat province. Medicinal plants were used by 68 percent (137/200) of diabetic patients surveyed. Eighty seven percent (120/137) of those were females, 80 percent (83/137) were from the pensioner group with a low educational background and income. Most medicinal plant users reported that they learnt about the qualities of medicinal plants through their friends and relatives with diabetes. Fifty-seven Thai plants were mentioned during the study. Notably, *Adographis paniculata* (The Creat) was mentioned 95 times, *Mormordica charantia* (Siamese karela) 46 times, *Tinospora crispa* 43 times, *Thunbergia laurifolia* 38 times and *Orthosiphon grandiflorus* 30 times. Despite overt encouragement from the Thai government in 1988 to use herbal medicine, large numbers of Thai diabetics still preferred to keep this usage of medicinal plants secret from their doctors. Patients' culture, occupation, educational background and duration of having diabetes were

predictors of the use of medicinal plants in this sample. Factors such as gender, occupation, income and educational attainment played a role in the performance on diabetes knowledge questions and psychological assessment. Satisfaction with western medicine was high within all socio-demographic groups.

BACKGROUND

This section provides brief information about Thailand and its people. The Thai health system, is critically reviewed particularly the impact of economic crisis on it in 1997 and after. Uses of medicinal plants among the Thai people are explored including recent changes. The prevalence of diabetes, its related complications, and the province and people, where this study carried out, are also highlighted.

Thai Health System during the Economic Changes

The population of Thailand was 61.46 million in 1998. Approximately 95 percent of the citizens are Thais and the rest are Chinese and Indians as well as other ethnic minorities. The Thai language is officially and commonly used for speaking and writing, while English tends to play a greater role particularly in the business sector. Most Thai people, approximately 92.6 percent, are Buddhists, followed by Muslims (5.3 percent) and others.

The King is the head of the country, exercising legislative power through the parliament, administrative power through the cabinet, and judicial power through the courts. The office of the Prime minister and 14 other ministries provide the central administration of the state.

The Ministry of Public Health is the agency with an important role in health project developments and the improvement of health status of Thai people. Potential developments to improve the health of Thai people are determined through the Health Development Plans (HDPs), which work alongside the National Economic and Social Development Plans (NESDP). To date, the 8th HDP was developed and critically revised with the economic crisis in 1997. The 8th Plan emphasizes development of human health behaviours, the expansion of health security coverage with efficient quality care particularly for the poor and unemployed groups that have arisen from the economic changes in 1997, and on the development of health industries.

The economic crisis in 1997 led to decreased income, cash flow and money value and rising interest rates. The crisis lowered both people's purchasing power and the government's revenue and budget. The Thai health system was also badly affected by this crisis (Health Situation and Trends, 1997-1998). The cost of curative medical care has risen. Each family, including those of very low income, has to bear a 3 – 5 percent higher cost of curative care (Thai Health Profile, 1997-1998). During the economic bubble, demand in the private health care sector rose from 6.7 percent in 1971 to 20.5 percent in 1996 (Thai Health Profile, 1997-1998). After the economic crisis, utilization of private health facilities dropped substantially due to people's declined purchasing power. Many turned to health services provided by the state. There were great disparities of income distribution between the rich and the poor, resulting in inequities in health resources allocation (Thai Health Profile, 1997-1998). For example, people in low-income groups were not eligible to receive kidney dialysis services when they are in the terminal stage of chronic renal failure, whereas people insured under the Social Security System, or Civil Servants, are eligible for such medical benefits.

Inaccessibility to health care services is a great problematic issue to the underprivileged group. There are large differences of opportunity in getting access to health services. In the urban areas, 81 percent of people had access to health services facilities with doctors, while only 47 percent of the rural people had such an access. Thus, the prevalence of herbal medicine use, particularly medicinal plants (Temsirirekkun, no date) and use of self-prescribed drugs, are commonly high among the people in the rural areas (Health Situation and Trends, 1997-1998).

During the economic crisis, the Thai Public Health Ministry formulated and revised a number of Strategies and Tactics for health developments to ensure that the 8th HDP was implemented aimed at achieving a desirable image of health for the Thai population in the future. One of their tactics includes enormous support for the development of Thai traditional medicine. They allocated at least 2 percent of the total health budget for this project. Health insurance coverage was also expanded in order to spread equity of health care accessibility to underprivileged groups, children and the elderly (Table 3.1). Eighty percent of Thais are now covered by one of the health insurance schemes.

For those ineligible groups, a new basic concept, **good health at low cost** was introduced for most acute illnesses. For example, each treatment of such illness will cost just 30 bahts (approximately 50 pence). This strategy emphasized cutting the costs of services but not quality by:

- reducing the number of drug items in hospitals;

- using drugs on the essential drug lists;
- using joint purchasing of drugs for the entire province;
- paying for services based on the capitation method in the Social Security System.

Table 3.1. Percentage of Health Insurance Coverage by Scheme, 1991 – 1998 (Health Situation and Trends, 1997-1998)

Health insurance scheme	Coverage Percent				
	1991	1992	1995	1997	1998
1. Medical care for the underprivileged	16.6	35.9	43.9	44.7	45.1
- The poor	16.3	20.7	15.5	13.4	13.5
- The elderly	-	6.2	4.6	4.9	5.5
- Children aged 0-5	-	-	7.1	7.3	7.3
- Primary and secondary schoolchildren	-	9.0	8.9	11.1	11.1
- War veterans	0.3	-	0.4	0.3	0.3
- Community leaders and volunteers	-	-	5.0	5.4	5.4
- The disabled	-	-	1.8	1.8	1.5
- Buddhist monks and novices	-	-	0.6	0.5	0.5
2. Medical services for civil servants and state enterprise employees	10.2	11.3	11.0	10.8	10.8
- Civil servants and family members	8.7	9.9	9.6	9.4	9.4
- State enterprise employees and family members	1.5	1.4	1.4	1.4	1.4
3. Compulsory health insurance	3.2	4.4	7.3	7.6	8.5
- Social security funds	-	4.4	7.3	7.6	8.5
- Women's compensation fund	3.2	-	-	-	-

MoPH = Ministry of Public Health

Table 3.1. Percentage of Health Insurance Coverage by Scheme, 1991 – 1998 (Health Situation and Trends, 1997-1998) continued

Health insurance scheme	Coverage Percent				
	1991	**1992**	**1995**	**1997**	**1998**
4. Voluntary health insurance	2.9	3.9	9.8	15.3	15.9
- MoPH health insurance	1.7	2.3	7.8	13.3	13.9
- Private health insurance	1.2	1.6	2.0	2.0	2.0
Total: people with health insurance	32.9	55.5	72.0	78.4	80.3
Total: people without health insurance	67.1	44.5	28.0	21.6	19.7

MoPH = Ministry of Public Health

Revival of Thai Traditional Medicine and the Use of Medicinal Plants and Herbs for Diabetes Mellitus

Changes in the usage of Thai traditional medicine have close ties with the political history of Thailand, especially the Chakri Dynasty. The relationships between the Chakri Dynasty and the use of medicinal plants are phased into four different eras.

1) Era of Thai Traditional Medicine Revitalization (1782 – 1851)

Use of medicinal plants and herbs was revised during the reigns of King Rama I (1782) through to at the end reign of King Rama III (1851). The formulas of Thai traditional medicine were assembled and inscribed, typically on the cloister walls of a temple (for example, in a temple called Wat Po). There were two types of doctors using this knowledge: (1) royal doctors (mo luang), who were civil servants and (2) private doctors (mo chaloei sak), who were non-civil servants.

During the reign of King Rama II (1809 – 1824) text books on traditional medicine were produced. All experts/practitioners around the country were invited to present their knowledge on various traditional medicine forms, formulas and practices to the King. Knowledge judged to be good was selected and documented in the Royal Formulas for the Royal Pharmacy (Tamra Luang Samyab Rong Phra Osoth). In 1816, the King promulgated the Royal Pharmacy to all of his people, and thus they passed on the practices to subsequent generations.

At the reign of King Rama III, the formulas of traditional medicine were inscribed on stone plates and stone columns around a temple's verandas (for example, in a place called Wat Ratchaorasaram). The formulas described both the causes of diseases and how to cure them. Rare medicinal plants were also planted so that people could study and use them for self-care.

During this era, an American missionary called Dr. Dan Beach Bradley introduced western medicine to Thailand for the first time.

2) Era of civilization and modern medicine and health services

During the reigns of King Rama IV through Rama VI, the relations between Thailand and Western countries progressed. The kings visited various countries and brought back numerous aspects of civilization, this included medical knowledge and ideas about health care. Although, the practice of traditional medicine was carried on through this period, especially among the non-civil servants, such practices were not as prevalent as during the first era.

During 1871 – 1929, the present King's father, known as Prince Mahidol, who graduated with a Qualification of Public Health and a Doctor of Medicine degree from Harvard University, United States, initiated modern medical practices and a health care system. Thai people enormously benefited from increased medical knowledge, health activities and funds the Prince introduced to the state. The Prince was later named "the father of modern medicine".

3) Era of the conception of the Ministry of Public Health

During the reign of King Rama VII (1925 – 1934), the law on modern medicine and traditional medicine practices was enacted, indicating that:

- **Modern medical practitioners** were those who used healing arts based on knowledge from international medical textbooks that had progressed through studies, research, and experiments of scientific experts worldwide;
- **Traditional medical practitioners** were those who used healing arts based on the observations and skills that had been verbally passed on from previous generations in the ancient notebooks with no scientific backup.

4) Era of western and plant medicines

Due to drug shortages during 1942 – 1943 and the expansion of the 2nd World War into Southeast Asia (during the reign of King Rama VIII), more herbal medicine studies were conducted. Numerous benefits were gained from medicinal plants and herbs, particularly for malaria. After the war ended, the problem of drug shortages remained so the government decided to expand the Pharmaceutical organisation of the Ministry of Public Health so that herbal medicine could widely be studied, produced, used and made available throughout the country.

The reintroduction of Thai traditional medicine, notably herbal medicine, began in 1988 (Grand, 1993). The programme involved using largely a community-oriented approach, in which people within the community were the main participants in the project. Herbal medicine was introduced back to the community as a complementary treatment to western drugs to treat some acute conditions.

In 1988, the Faculty of Pharmacy of Mahidol University, set out to establish a medicinal plants garden to serve as a centre for the cultivation and preservation of valuable medicinal plant species as well as a centre for the study of all aspects of Thai medicinal plants.

Since the impact of the economic crisis in 1997, plus the new trend toward alternative medicine abroad, use of medicinal plants and herbs are now widely used in Thailand. Traditional medicine in Thailand is simply regarded as a 'folk medicine' (Thailand Illustrated, 1998). However, it is now taught professionally through various courses. Such courses were organised by the National Institute of Thai Traditional Medicine (NITTM), which was established in 1993 as part of the Ministry of Public Health.

According to the World Health Organisation, 80 percent of people in developing countries rely on traditional herbal medicines (Wagner and Farnsworth, 1990). A report in Thailand Illustrated (1998), indicated that at least 24 percent of the Thai population used traditional and herbal medicine for their illnesses. Thai people use medicinal plants and herbs for various reasons and illnesses. This may stem from the high costs of drugs, and costs of repeated transportation to hospital and access to physicians trained in western medicine. Thus, various kinds of herbal medicine are widely available at many public health centres throughout the country.

Traditionally, aetiological or casual factors of disease were thought to be: (1) super-natural; (2) natural, for example as an imbalance between the four elements earth, water, wind and fire; and (3) universal forces. Many traditional practitioners also believed that aging, seasonal, behavioural and geographical factors are related to ill health in all humans.

Thai medicinal plants/herbs for diabetes mellitus

Over 100 Thai plants and herbs are believed to possess hypoglycaemic activities (The Faculty of Pharmacy of Mahidol University, 2002) (Figure 3.1 and Table 3.2 and Table 3.3). Folklore in Thailand also believes that "poison is sweet, but medicine is bitter" and such belief is somewhat associated with the health beliefs about diabetes treatments in Thailand (through personal communication).

Many of these medicinal plants (Figure 1) taste very bitter, for example, *Momordica charantia* (Siamese karela), *Tinospora crispa, Andrographis paniculata,* a fruit of *Coccinia gradis, Phyllantus amarus, Phyllanthus urinarin, Solanum sanitwongsei* and *Solanum trilobatum*. There are, however, plants which Thai folklore believes to have hypoglycaemic activity that do not taste bitter. For example, *Aloe vera, Nelumbo nucifera* (Lotus flower), *Ocimum basilicum* (Hairy basil seed), *Pandanus odour, Psidium guava* (Guava fruit), *Orthosiphon grandiflorus* (Cat's whisker), *Piper sarmentosum* , and *Allium sativum* (garlic).

A Medline-search was conducted (1985 – 2002, mesh heading hypoglycaemic, diabetes, plants, herbs, phytomedicine) for scientific evidence for the alleged Thai medicinal plants for diabetes mellitus. Over one thousand articles were scanned and reports of 26 plants with positive hypoglycaemic effects were retrieved. Such plants are stratified into 4 main groups as follows.

I. Used locally, but there is no recent (1985 – 2002) scientific evidence found (Figure 3.1). Examples include, *Acanthus ebracteatus* (White Sea Holly), *A. ilicifolius* (Purple Sea Holly), *Cossia siamea* (Cassod tree), *Nibiscus sabdariffa, Rhinacathus nasutus, Nelumbo nucifera* (Lotus flower), *Phyllanthus amarus* and *P. urinarin, Piper sarmentosum, Orthosiphon grandiflorus* (Cat's whisker), *Solanum sanitwongsei, Solanum trilobatum, Cymbopogon citratus* (Lemon grass), *Schefflera leucantha, Piper retrofractum* and *Thunbergia laurifolia.*

II. Used locally, but no evidence of hypoglycaemic effect found in either animal or human experiments. For example, *Solanum torvum* and *Syzygium cumini*, which are grown throughout Thailand. *Solanum torvum* is a green curry culinary and *Syzygium cumini* is fruit. Thai folklore believes that both are good for diabetes. Experiments on *Solanum torvum* in a human trial (Iyer, et al., 1992) and *Syzygium cumini* in animals (Teixeira, et al., 1997), have however, revealed no effects. Consumption of *Solanum torvum* did not improve glucose, lipids profile, glycated proteins, total amino acids nor uronic acid levels in patients with NIDDM. Drinking a tea prepared from *Syzygium cumini* (L.) did not have any effect on blood glucose either in normal or in diabetic rats.

III. Used locally, but linked with unbeneficial effects. An example is, *Bixa ovellana*, which was found to cause hyperglycaemia and which had possible links with damaged mitochondria and endoplasmatic reticulum, mainly in liver and pancreas, in experimental dogs (Morrison, et al., 1991).

IV. Positive hypoglycaemic activity found, but evaluated only in animal experiments. There are a number of hypoglycaemic effects demonstrated in animal models (Table 3.2). The hypoglycaemic effects demonstrated in animal models are, however, not necessarily transferable to humans, and Ernst (1997) recommended that for clinical use, trial data from diabetic patients and volunteers are essential.

V. Positive hypoglycaemic activity found in human trials (Table 3.3), however its usefulness is not totally confirmed for human use due to the quality of methodology applied. For example, the studies of Augusti et al. (1975), Letherdale

(1981), Fernando, et al. (1991) and Ghannam (1986) were conducted without controls.

Table 3.2: Positive hypoglycaemic effects of plants found in animal trials

First author (year of publication)	Plant	Samples	Dose	Result
Cheng & Yang (1983)	Guava *Psidium guajava*	Normal and alloxan-induced diabetic mice	1g/kg body weight	Produced a marked hypoglycaemic action in both experimental animal groups.
Ghannam et al., (1986)	*Aloe vera*	Non-diabetic and NIDDM albino mice	500mg/kg gel extract compared with 10mg/kg glibenclamide twice/day	Induced hypoglycaemia after 5 days
Noor & Ashcroft (1989)	*Tinospora crispa*	Non-diabetic and alloxan-induced diabetic rats	1. Drinking 4g/L of an aqueous extract of *T. crispa* stem 2. Intravenous 50mg/kg extract	1. Oral 4g/L in the drinking water showed improvement in glucose tolerance test after 2 weeks treatment 2. Acute intravenous with the extract caused an increase in plasma insulin levels

Table 3.2: Positive hypoglycaemic effects of plants found in animal trials (Continued)

First author (year of publication)	Plant	Samples	Dose	Result
Akhtar et al (1990)	*Mucuna prurieus*	Normal and alloxan-induced rabbits	0.5, 1, 2 g/kg body weight of *M. prurieus* seeds	1. 500mg/kg significantly reduced the blood glucose levels in normal rabbits 2. 1, 2g/kg caused a significant fall in glucose level in diabetic animals 3. It indirectly stimulated the release of insulin
Kumar et al. (1992)	*Coccinia indica*	Normal and diabetic albino rats	Administration of pectins isolated from the fruit of *C. indica* at a dose of 200mg/100g body weight	Showed significant hypoglycaemic action in normal and diabetic rats and increased liver glycogen.
Das et al. (1996)	*Aegle marmelose*	Strepzotocin rats	Not specified	The leaf extract improved functional state of pancreatic beta-cells.

Table 3.2: Positive hypoglycaemic effects of plants found in animal trials (Continued)

First author (year of publication)	Plant	Samples	Dose	Result
Kakuda et al. (1996)	*Lagerstroemia speciosa.*	Diabetic KK-AY mice	Administration of diet containing 5% of hot-water extract from *L. speciosa* leaves of 5 weeks	1. Lowered glucose in urinary excretion 2. Lowered plasma total cholesterol
Aderibigbe (1999)	*Mangifera indica*	Normal, glucose-induced hyperglycaemia and streptozotocin-induced diabetic rats	Oral of aqueous extract 1g/kg body weight	Anti-diabetic activity found only in glucose-induced hyperglycaemic groups.
Puri & Baral (1998)	*Biophylum sensitivum*	Alloxan-induced diabetic males rabbits Of different severities: Sub-diabetics, mild-diabetes and severe diabetics	200mg/kg body weight plant leaves extract	After 1 and 2.5 hours of a single dose administration, fasting plasma glucose fell by 26% and 27% in sub-diabetic and by 37& and 38% in mild diabetic rabbits.

Table 3.2: Positive hypoglycaemic effects of plants found in animal trials (Continued)

First author (year of publication)	Plant	Samples	Dose	Result
Kumar & Reddy (1999)	Garlic *Allium sativum*	Alloxan-diabetic mice	Administration of ethanol (95%) extract of garlic (45mg/kg body weight) for 28 days	Showed significant improvement of serum glucose levels. The effectiveness increased with increased duration of extract administration.
Peungvicha et al. (1998)	*Pandanus odorus*	Streptozotocin diabetic rats	4-hydroxy benzoic acid of *P. odorus*	Caused a decreased in plasma glucose levels. No effect on serum insulin levels and liver glycogen content.
Hsu et al. (2000)	*Xanthium strumarium*	Streptozotocin-induced diabetic and insulin resistant models	Intravenous injection of caffeic acid	Reduced elevation of plasma glucose levels in insulin resistance models
Bolkent et al. (2000)	*Beta vulgavis*	Glucose-induced hyperglycaemic and streptozotocin-induced diabetic rats	Not specified	Reduced the blood sugar levels in hyperglycaemic rats, but not in diabetic rats. Body weight significantly increased. Maximum reduction in blood glucose levels was observed on the 42nd day.

Table 3.2: Positive hypoglycaemic effects found in animal trials (Continued)

First author (year of publication)	Plant	Samples	Dose	Result
Khosla et al. (2000)	Neem *Azadirachta indica*	Normal and diabetic rats	Administration of leaf extract or seed oil for 2 weeks prior to alloxan	1. Reduced blood glucose levels 2. Its hypoglycaemia effect was comparable to that of glibenclamide 3. Prevented the rise in blood glucose levels as compared to control diabetic animals
Zhang & Tan (2000a & 2000b)	*Andrographis paniculata*	Normal and Streptozotocin rats	Treated orally by: 1. distilled water 2. 500mg/kg body weight metformin 3. 400mg/kg body weight aerial parts of *A. paniculata* 2 times daily for 14 days	The extract and metformin significantly increased body weight and reduced fasting serum glucose in diabetic rats, but had no effect on body weight and serum glucose in normal rats. *A paniculata* may also reduced oxidative stress in diabetic rats.

Table 3.2: Positive hypoglycaemic effects found in animal trials (Continued)

First author (year of publication)	Plant	Samples	Dose	Result
Meral (2001)	*Nigella sativa*	15 New Zealand normal and diabetic rabbits	Orally administered extract of *N. sativa* for two weeks	A decrease in elevated plasma glucose concentration in diabetic rabbits
Takeuchi et al. (2001)	Sesame *Seseamum indica*	Diabetic mice	Group 1. 4% of hot-water extract from defatted sesame seeds Group 2. 1.4% of water dilute fraction of hot-water extract Group 3. 0.7% of the methanol dilute fraction of hot-water extract	A reduction of plasma glucose concentration showed in diabetic mice Group 2, but most significantly in Group 3.
Puri (2001)	*Biophylum sensitivum*	Alloxan diabetic rabbits	200mg/kg body weight	Attenuated the plasma glucose response to oral administration of 3g/kg body weight glucose load. Serum insulin levels showed a rise at the end of 2 and 6 hours by 13.7% and 12.6%.

Table 3.2: Positive hypoglycaemic effects found in animal trials (Continued)

First author (year of publication)	Plant	Samples	Doses	Result
Okyar et al. (2001)	*Aloe vera*	Non- diabetic, IDDM and NIDDM diabetic rats	Leaf pulp and gel extract	*A. vera* leaf pulp extract decreased plasma glucose levels in IDDM and NIDDM diabetic rats, but not in a non-diabetic group.
Aderibigbe (2001)	*Mangifera indica*	Normal, glucose-induced hyperglycaemic and streptozotocin-diabetic mice	Aqueous extract, orally administered	Caused a reduction of blood glucose in normoglycaemic and glucose-induced hyperglycaemic mice.
Jeppesen et al. (2002)	*Stevia rebaudiana*	Normal Wistar rat and non-obese NIDDM diabetic rats	Injections 0.2g/kg body weight of *Stevia rebaudiana*	*Stevia rebaudiana* Bertoni suppressed the glucose response to a glucose tolerance test in NIDDM diabetic rats and concomitantly increased the insulin response. In normal Wistar rats, *Stevia rebaudiana* enhanced insulin levels above basal during the glucose tolerance test without alerting blood glucose response or the glucagon levels.

Table 3.2: Positive hypoglycaemic effects found in animal trials (Continued)

First author (year. of publication)	**Plant**	**Samples**	**Dose**	**Result**
Gray & Flat (1999)	Coriander *Coriandrum sativum*	Streptozotocin diabetic mice	62.5 g/kg coriander incorporated into the diet and 2.5 g/L drinking water	Reduced hypoglycaemia in diabetic mice.
Arun & Nalini (2002)	Turmeric *Curcuma langa*	Alloxan-diabetic rats	Not specified	Reduced blood sugar and HbA1C significantly and reduced oxidative stress.

Table 3.3: Positive hypoglycaemic effects of plants found in human trials

First author (year of publication)	Plant	Samples	Dose	Results
Leatherdale et al. (1981)	Karela *Momordica charatia*	9 NIDDM patients	1. 50ml karela juice 2. 0.23 kg fried karela for 8-11 weeks	1. Glucose levels and glucose tolerance improved 2. Glycosylated Hb fell significantly
Cheng & Yang (1983)	*Psidium guajava*	Healthy subjects and NIDDM patients	?	Oral administration of the fruit lowered blood glucose in both healthy volunteers and NIDDM patients
Tjokroprewiro et al. (1983)	Onion *Allium ascalonicum* Green beans *Phaseolus aureus*	20 NIDDM patients	1. 3 x 20 g fresh onion daily 2. 3 x 200 g green beans daily	1. Onion showed significant decrease in blood glucose levels 2. No effect found for green beans
Welihida et al. (1986)	Karela *Momordica charantia*	NIDDM patients	?	Fruit juice of *Momordica charantia* improved the glucose tolerance of 73% of the patients

Table 3.3: Positive hypoglycaemic effects of plants found in human trials (Continued)

First author (year of publication)	**Plant**	**Samples**	**Dose**	**Results**
Augusti et al. (1975)	Onion *Allium cepa*	6 healthy subjects	0.125 g of essential oil per 50 kg body weight	Glucose fell from 750±2.4 to 63±2.3 mg/100ml and insulin rose from 7.0±1.6 to 11.0±24.4 μ unit/ml
Azad Khan et al. (1979)	*Coccinia indica*	16 NIDDM patients	Leaves preparation for 6 weeks	Marked improvement in the glucose tolerance showed in 10 out of 16 patients
Sharma et al. (1990)	Fenugreek *Trigonella foenumgraecum*	IDDM patients	Defatted fenugreek seed powder 100 g served twice daily for 10 days	1. Fenugreek diet significantly reduced fasting blood glucose, serum total cholesterol, LDL, VLDL cholesterol and triglycerides, but HDL remained unchanged, and improved the glucose tolerance 2. 54% reduction in urinary glucose excretion
Ghannam (1986)	*Aloe vera*	5 NIDDM patients	½ tea spoon full daily for 4-5 weeks	Fasting serum glucose levels fell significantly in every patient from a mean of 233±25 mg/dL to 151±23 mg/dL with no change in body weight

Table 3.3: Positive hypoglycaemic effects of plants found in human trails (Continued)

First author (year of publication)	Plant	Samples	Dose	Results
Iyer (1992)	*Solanum torvum*	30 NIDDM patients	7 g +	No change of glucose, lipids and glycated proteins
Contractor et al. (1999)	Mango *Mangifera indica* and Banana *Musa paradisiaca*	10 NIDDM patients	Not specified	Both reduced blood glucose levels
Ahmed et al. (1999)	*Momordica charatia*	100 cases of NIDDM patients	Drinking of the aqueous homogenized suspension of the vegetable pulp	Significantly reduced both fasting and post-prandial serum glucose levels in 86 cases. Five cases showed lower fasting serum glucose only.
Gupta et al. (2001)	Fenugreek *Trigonella foenumgraecum*	Mild to moderate NIDDM patients	Group 1 (n=12) received 1 g/day hydroalcoholic extract of feneugreek seeds for 2 months Group 2 (n=13) received usual care (dietary control and exercise) + placebo for 2 months	At the end of two months, group 1 showed a significant decrease of blood glucose, serum triglycerides levels and an increase in HDL cholesterol compared to group 2

Table 3.3: Positive hypoglycaemic effects of plants found in human trials (Continued)

First author (year of publication)	Plant	Samples	Dose	Results
Bernhard (2002)	*Ipomoea batatas*	18 NIDDM male patients	Group 1. received placebo Group 2. received 2 g of *Ipomoea batatas* Group 3. received 4 g of *Ipomoea batatas*	After 6 weeks of the ingestion of 4 g/day of *Ipomoea batatas*, fasting blood glucose, total as well as LDL cholesterol reduced significantly in NIDDM patients. It also improved insulin sensitivity without any side effect.
Bordia et al. (1997)	Fenugreek *Trigonella foenumgraecum* and Ginger *Zingiber officinale*	Healthy subjects, NIDDM patients with coronary artery disease (CAD) and NIDDM patients without CAD	1. 2.5 g of fenugreek twice daily for 3 months 2. 4 g of ginger daily for 3 months	1. Neither species showed any effects in health group 2. Fenugreek significantly decreased blood lipids, total cholesterol and triglycerides in patients with CAD and NIDDM patients without affecting HDL levels 3. Fenugreek significantly reduced blood glucose

Figure 3.1: Thai medicinal plants/herbs for Diabetes Mellitus

Boesenbergia rotun

-

ZINGIBERACEA

Acanthus ilicifolius

(Sea Holly)

ACANTHACEAE

Pipernigrum

(Pepper)

PIPERACEAE

Cassia siames

(Cassod Tree)

LEGUMINOSAE

Alstonia scholaris

(Black board tree)

APOCYNACEAE

Figure 3.1: Thai medicinal plants/herbs for Diabetes Mellitus (continued)

Hibiscus sabdariffa

(Roselle)

LYTHRACEAE

Biophytum apodiscias

-

OXALIDACEAE

Acacia catechu

(Spong Tree)

MINOSACEAE

Lagerstfoemia speciosa

(Queen's flower)

LYTHRACEAE

Figure 3.1: Thai medicinal plants/herbs for Diabetes Mellitus (continued)

Andrographis paniculata

(The Creat)

ACANTHACEAE

Orthosiphon grandiflorus

(Cat's whisker)

LABIATAE

Thumbergia laurifolia

-

THUNBERGIACEAE

Coccinia indica

(Ivy gourd)

CUCURBITACEAE

Figure 3.1: Thai medicinal plants/herbs for Diabetes Mellitus (continued)

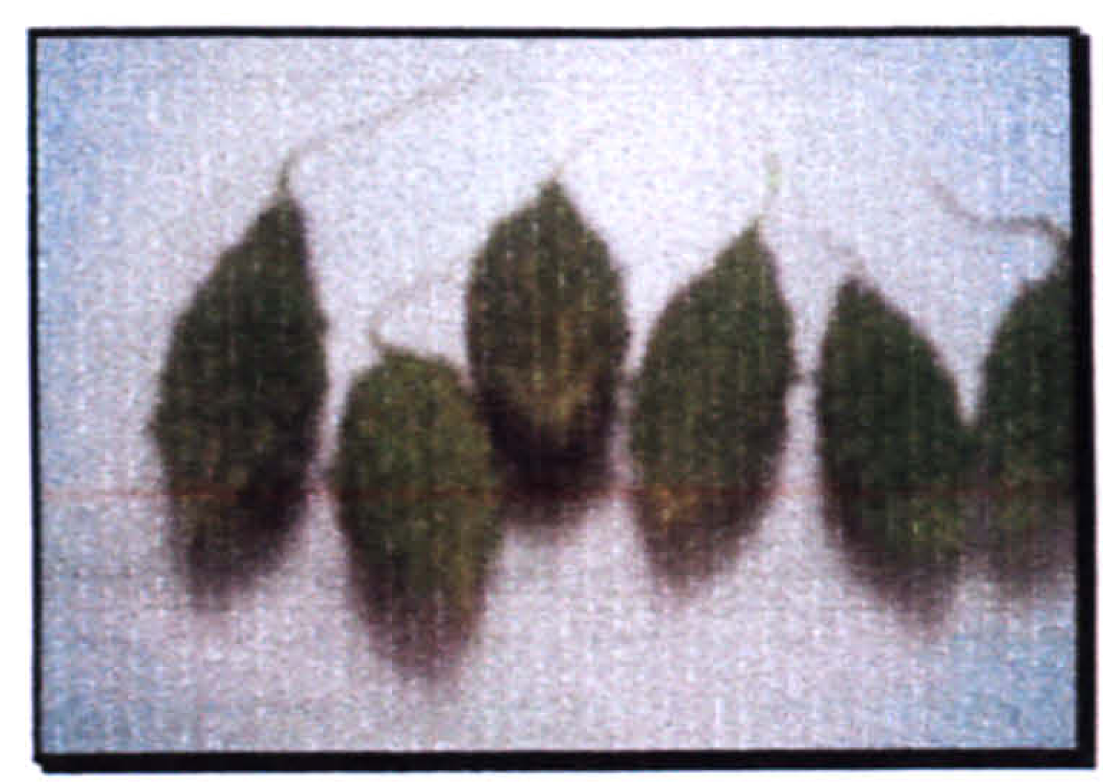
Murdannia loriformis (Kammathy) **COMMELINACEAE**

Tinospora crispa **MENISPERMACEAE**

Ocimum basillican Linn.

(Hairy Basil)

LABIATAE



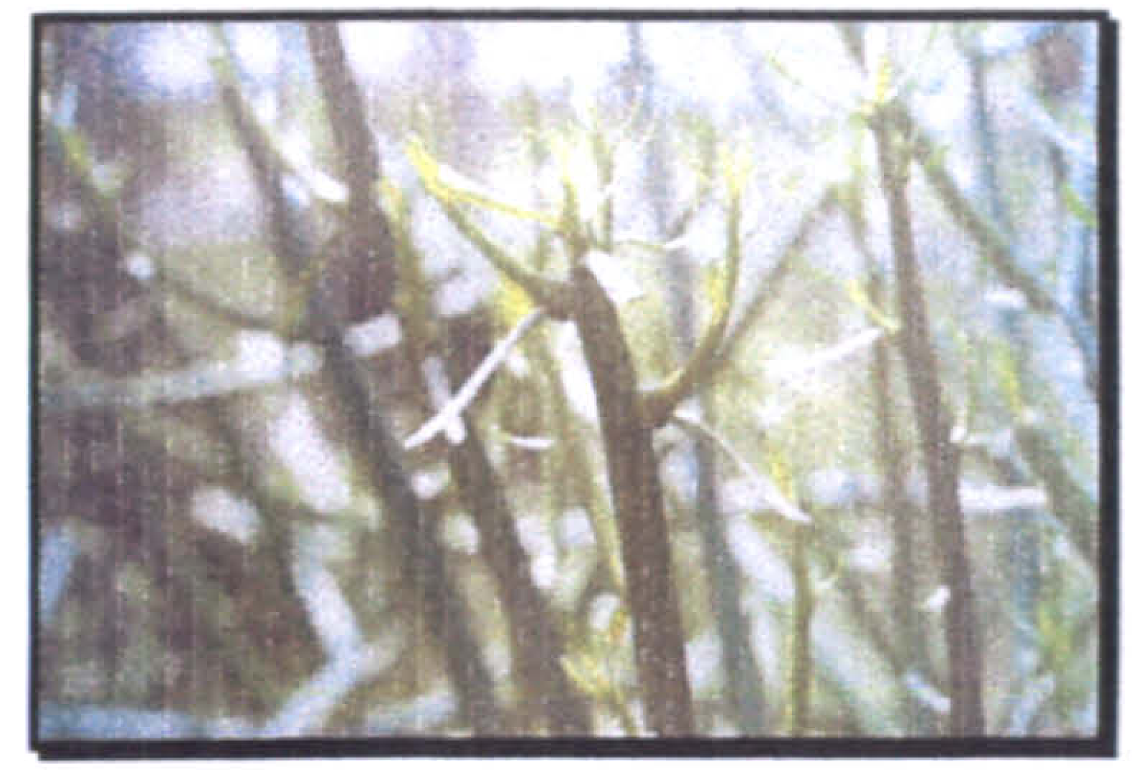
Momordica charantia

(Siamese Karela)

CUCURBITACEAE

Figure 3.1: Thai medicinal plants/herbs for Diabetes Mellitus (continued)

Solanum trilobatum **SOLANACEAE**



Euphorbia tirucalli **ASCLEPIADACEAE**

Rhinacanthus nasutus

\-

ACANTHACEAE

Piper sarmentosum

\-

PIPERACEAE

Solanum sanitwongsei

\-

SOLANACEAE

Carthamus tinctorius

(Safflower)

COMPOSITAE

Figure 3.1: Thai medicinal plants/herbs for Diabetes Mellitus (continued)

Cardiospermum halicaca

(Ballon Vine)

SAPINDCEAE

Terminalia chebula

(Terminalla Gall)

COMBRETACEA

Barleria strigosa

-

ACANTHACEAE

Figure 3.1: Thai medicinal plants/herbs for Diabetes Mellitus (continued)

Cyperus rotundus

(Nut Grass)

CYPERACEAE

Schefflera leucantha

-

ARALIACEAE

Amorphophallus campanulatus

(Stanley's water-tub)

ARACEAE

Figure 3.1: Thai medicinal plants/herbs for diabetes mellitus (continued)

Cymbopogon citratus

(Lemon Grass)

GRAMINEAE

Stevia rebaudiana

(Sweet Grass)

COMPOSITAE

Ocimum sanctum

(Holy Basil)

LABIATAE

Bridelia ovata

-

EUPHORBICEAE

Stemona tuberosa

-

STEMONACEAE

Use of herbal medicine for diabetes in Thailand is considerable (Office of Thai Primary Health Care, 1985). Over 84 percent of Thai diabetic outpatients admitted using herbal medicine, 52 percent said they were using herbal medicine in conjunction with conventional medicine prescribed by their physicians, and 32 percent were former users of herbal medicine, who had stopped using it when no effect was found (Reawpibol, no date). More than 60 percent of Thai herbal medicine users are satisfied with and believed in the effectiveness of herbal medicine, while 23 percent were not totally satisfied and 11 percent did not believe in this herbal medicine at all (Archananupon, no date).

Diabetes is, however, a chronic condition that is incurable. Many phytomedicine researchers suggest that herbal medicine is best used after conventional medicine has failed to treat such a long-term condition (Sharma, 1992; Fulder and Munro, 1992; Tamsirilekkul, 1996). Most diabetic patients in Thailand ($\geq$ 95 percent) are non-insulin dependent diabetics (type 2 diabetes) (Nitiyanant, 1991; Tamwiwat, 1997; Deerochanawong, 1997). In Thailand, the amputation and mortality rates in diabetic patients with foot ulcers were 20 and 25 percent, respectively (Vichayanrat, et al., 1979; Sriussadaporn, 1997).

The preliminary study reported extends the two studies by Reawpibol (no date) and Archananupon (no date). In addition, it includes more questions on treatment satisfaction, psychological assessment and diabetes knowledge. This study will provide more up to date figures on herbal medicine users with diabetes and indicate factors, which may be associated with the use of herbal medicine among diabetics in present Thailand.

Aims

This preliminary study aims to investigate the prevalence of using medicinal plants for diabetes mellitus and the factor(s) that may mediate decisions to use non-orthodox treatment in a rural area of a developing country (Thailand).

The Prevalence of Diabetes Mellitus in the study area: Chai Nat, Thailand

Chai Nat is a province situated in the middle region of Thailand. It consists of 6 amphurs (an administrative sub-division of a province) with 466 villages spread around Chai Nat. The area is approximately 2,469,746 SqKm. The population is estimated as 353,749 (171,828 males, 181,921 female). The majority of the population are farmers. Rice is the typical product of this province, and the typical wage is around 730 pounds per head, per year. There is one hospital per province. The hospital is situated in the main part of Chai Nat town, known as Chai Nat Hospital (where this study was conducted).

Screening for diabetes was started in 1996. The reported prevalence increased rapidly from the initial screening year. The number of diabetics rose from 62.85/1000 in 1996 to 85.37/1000 in 1997 to 116.15/1000 in 1998 (Table 3.4). There are 41,614 registered diabetics which is 11.8 percent of the whole population of Chai Nat. The incidence is highest within the female group aged between 35 and 59, with more than 95 percent being diagnosed with type 2 diabetes (Table 3.5).

Medical treatments and pharmaceutical drugs are not always affordable for every patient in Thailand. Most pharmaceutical drugs in Thailand, including those for diabetes, are basically products from the western world. Despite the fact that anti-diabetes drugs are now being produced in Thailand (Ely Lily and Bayer both situated in Bangkok), prices of some drugs are still excessively high. A visit to a diabetes clinic in Chai Nat hospital could cost up to £50 (3000 bahts) in some cases (via personal communication). Although money spent on medical expenses and drugs may be reimbursable to some groups (Table 3.6), difficulty in finding the initial sum may be one of the causes of the rising number of people with diabetic complications in this country.

Table 3.4: The prevalence of diabetes mellitus and heart disease in the province of Chai Nat (Chai Nat, Thailand Public Health Annual Report 1998)

Year	Number and rate of out-patients			Number and rate of in-patients		
	Diseases	Number	Cases/1,000	Diseases	Number	Cases/1,000
1996	Heart disease	26,968	77.47	Heart disease	516	148.24
	Diabetes	21,876	62.85	Diabetes	267	76.70
1997	Heart disease	43,553	124.22	Heart disease	882	251.56
	Diabetes	29,931	85.37	Diabetes	564	160.87
1998	Heart disease	58,992	167.33	Heart disease	1,012	280.05
	Diabetes	40,947	116.15	Diabetes	667	189.20

Table 3.5: Screening of population for diabetes mellitus in the Province of Chai Nat, in 1998 (Chai Nat, Thailand Public Health Annual Report 1998)

Place (Amphur)	**Number of chosen villages**	**Population aged 35 – 59 years old**				**Number of newly diagnosed among screened population**	**Cases per 1000 (a)**	**Number of newly diagnosed among screened population**	**Cases per 1000 (a)**
		Total screened		**Number of known diabetics**		**Male**		**Female**	
		Male	Female	Male	Female				
Maung	11	641	836	22	17	2	37.44	1	21.53
Sunbury	14	769	908	4	26	2	7.80	26	57.27
Suppaya	13	870	996	83	96	2	97.70	5	101.40
Hunca	11	775	793	2	16	-	-	-	-
Watsing	7	108	225	4	11	-	-	-	-
Manorom	8	768	891	12	41	1	16.93	2	48.26
Nhongmamong	7	435	469	10	9	4	32.18	7	34.11
Nemkham	4	147	152	2	3	-	-	-	-
Total	75	4,513	5,270	139	219	11	33.24	23	45.92

Cases per 1000 (a) = [(number of known diabetic + number of newly diagnosed)/ total screened] x 1000

Table 3.6: Groups eligible for a free medical treatment card in Thailand (Chai Nat, Thailand Public Health Annual Report 1998)

The eligible groups	**Number of card holders** (Total population 353,749)
1. Children age between 0-12 years old	37,231
2. Age between 13 – 60 years old	
- Low income	28,914
- Student	5,861
- Disabled	647
- War veteran	105
- Monk	470
3. Aged 60 +	
- Elderly	40,524
Total number of card holders	113,752[a]

[a] Covered 32.15% of total population

METHODOLOGY

Full details of design, modifications and translation, pilot studies and reliability of the interview-schedule and the scales for this study are presented in Chapter 2. This section briefly discusses the scientific technique selected for this study.

A face-to-face structure interview was selected as the most useful technique for this study. It is more expensive and time-consuming than a self-administered questionnaire and requires a skilful interviewer. It is, however, less challenging for participants, especially those of low socio-economic status or educational background, and pensioner groups (Abramson and Abramson, 1999). Rejection rates and incomplete answers are lower in face-to-face-interviews than in self-administered questionnaires (Abramson and Abramson, 1999). It is suggested that a good interviewer can motivate and maintain the respondent's interest, and can also create an atmosphere conductive to the answering of questions (Bowling, 1997). It can be applied to all levels of education or attainment, as if a question is not understood, an interviewer can repeat it and, if necessary, provide an explanation or alternative wording. Furthermore, an observation can be made in the face-to-face interview and the interviewer can also use visual aids to help explain a particular word or situation.

Characteristics of the participants

In 1998, there were 41,614 people in the province of Chai Nat registered with Ministry of Public Health-Chai Nat as diabetics (through personal communication with the Registrar Officer of the Ministry of Public Health of Chai Nat, 1998). To obtain the pre-determined number of 200 participants, two hundred and fifty diabetics registered within a Chai Nat Hospital (Amphur Maung), were approached. Eighty percent agreed to be interviewed while waiting to see their diabetologist. Patients who were younger than 19 years of age, suffering from severe forms of diabetic complication, e.g. lost of eye sign(s), kidney failure, or diagnosed with mental health problems and learning disability were excluded from the study.

RESULTS

This section concentrates on the overall of findings from the interview-schedule. Patients are classed as users and non-users of medicinal plants. This is the outcome variable of primary interest. The two groups (users vs. non-users) are compared in a series of univariate analyses on categorical variables with Pearson Chi-square tests, on ordinal variables with Mann-Whitney and Kruskal-Wallis tests, and on continuous variables, e.g. ATT19, DKN and DTQS with independent t-tests. Similar tests, plus ANOVA and linear regression are used to explore relationships among the predictor variables. Logistic regression is used to develop a model equation to predict users of medicinal plants based upon the variables found to be significant in the univariate analyses.

Reliability of the scales

The reliability of scales: (1) ATT19, (2) DKN and (3) DTSQ were examined using with Cronbach's alpha coefficient of internal consistency.

(1) ATT19 – The alpha value for the 19-item attitudinal scale was .96. The mean score for the scale was 47.51 (SD = 16.38) (Table8). According to Pallant (2001), Cronbach's alpha over 7 is considered adequate. Thus the alpha = .96 for this scale is considered very reliable for our sample.

(2) DKN – The alpha for the 15-item diabetes knowledge scale was .64. Nine out of fifteen items (items: 1,2,3,10,11,12,13,14 and 15) showed very low corrected item-total correlations (less than .3). As more than half of the scale had low correlation with the total score and the scale's overall Cronbach's alpha was also low, this scale might not be ideal for our sample.

(3) DTSQ – For the 8-item satisfaction scale, Cronbach's alpha was also low (.56). Six out of eight items had low corrected item-total Correlations (less than .3). Thus this scale too might not be appropriate for our sample.

Despite these low reliability coefficients, it seemed worthwhile to explore the relationships between the DTSQ and DKN scores and other variables, but clearly findings need to be interpreted with caution.

Table 3.7: The reliability of the scales

Scale	Items number	Scale		Alpha Coefficient
		Mean	SD	
ATT19	19	47.51	16.34	.95
DKN	15	8.19	2.79	.64
DTSQ	7	36.88	2.72	.56

Demographic characteristics

The majority of patients (88.5 percent) described themselves as Thais, while the rest were originally Chinese and Indian. All participants were Buddhists and spoke the Thai language.

Age and Gender

The age and gender distribution of participants is shown in Table 3.8. The mean age was 55 years, the youngest participant was 19 years old and the eldest one was 80 years old. There were 52 males (26 percent) and 148 females (74 percent). There was not a significant association between age group and gender, $\chi^2(2) = 1.31, p = .520$.

Table 3.8: Age and gender of distribution of participants

Age group	Gender		Total
	Male	Female	
19 – 39	7	17	24
40 – 69	37	116	153
70 +	8	15	23
Total	52	148	200

Marital Status

Four categories were made available for marital status classification: single, married, divorced and widowed. The distribution of participants among these four categories is shown in Table 3.9.

Table 3.9: Distribution of marital status

Marital status	Participants	
	Number	Percentage (%)
Single	8	4
Married	136	68
Divorced	16	8
Widowed	40	20

Educational background

The majority of females (71 per cent) reported having an education only to a primary school level. However, 13 percent, all being females, reported that they had no education (Table 3.10). The Mann Whitney test was used to compare genders in terms of their educational background, treating educational background as an ordinal variable. It was found that educational background was statistically different between males and females ($Z = -6.53$, $p < .0005$).

Table 3.10: Distribution of educational background and gender

Educational background	Gender		Total
	Male	Female	
None		26	26
Primary school	19	100	119
Secondary school	9	6	15
High school	11	4	15
College/university	13	12	25
Total	52	148	200

Economic level and Occupation

A cross classification of monthly income and occupation is shown in Table 3.11. The Kruskal-Wallis test was used to compare monthly income across occupation categories (Table 3.11), treating income as an ordinal scale. The Kruskal-Wallis test showed a clear association between monthly income and occupation ($\chi^2 = 97.73$, df = 2, $p < .0005$).

Table 3.11: Monthly income across occupation categories

	Occupation	N	Mean Rank
Monthly income	Pensioner	104	72.83
	Professional	29	175.62
	Manual worker	67	110.93
	Total	200	

Pairwise comparisons using Mann-Whitney tests showed cleared significant differences between pairs of occupation categories (Table 3.12).

Table 3.12: Comparisons of monthly income across occupational categories

	Occupation	N	Mean Rank	Z value	*p-value*
Monthly income	Pensioner	104	53.70	-9.28	<.0005
	Professionals	29	114.69		
	Pensioner	104	53.70	-5.90	<.0005
	Manual worker	67	108.31		
	Professionals	29	75.93	-6.60	<.0005
	Manual workers	67	36.63		

Not surprisingly, high levels of education were associated with higher monthly income. A strong, positive correlation between monthly income and education [r = .51, n = 200, $p < .01$] was found when a Spearman Correlation test was used to compute and report a rank correlation. In this analysis both monthly income and education were treated as ordinal variables.

Medical data

This section concentrates on medical data, as described by the participants, including issues relevant to treatment access, such as distance from home to hospital, average time spent on the journey and type of transport used to get to hospital.

Body Mass Index (BMI)

The mean BMI (kg/m^2) was 24.49, the minimum was 15.45 and the maximum was 32.03 (Table 3.13). Nearly seventy percent of participants were in the range normally described as acceptable weight (BMI = 26.4 to 27.8 for men and 25.8 to27.3 for women), and 28.5 percent as overweight or morbidly obese.

Table 3.13: Body Mass Indexes

BMI	Participants	
	Number	Percentage (%)
Lowest through 19.00	8	4.0
19.01 – 26.40	135	67.5
26.41 – 27.80	24	12.0
27.81 – 31.10	26	13.0
31.11 – 46.00	7	3.5
Total	200	100

Key (Whitney and Rolfes, 1996):

Underweight (BMI = <20.7 for men and <19.1 for women)

Acceptable weight (BMI = 20.7 to 26.4 for men and 19.1 to 25.8)

Marginal overweight (BMI = 26.4 to 27.8 for men and 25.8 to27.3 for women)

Overweight (BMI = 27.8 to 31.1 for men and 27.3 to 32.2 for women)

Morbid obesity (BMI = >45.4 for men and >44.8 for women)

Type of treatment prescribed and number of years with diabetes

According to the information given by the participants, more than eighty percent (n= 173) receiving hypoglycaemic tablets as a treatment for their diabetes, while the rest (n= 27) were on insulin treatment.

The majority of participants (n= 137) had diabetes for more than 3 years, while 48 participants had diabetes for between 1.1 year and 3 years and 15 participants had diabetes for less than a year.

Type of treatment was not significantly associated with gender (χ^2 = .806, df = 1, p = .81), age group (Mann-Whitney test: Z-value = -1.29, p = .19) nor educational background (Mann-Whitney test: Z-value = -1.80, p = .07).

Distance from home to hospital (km) and time taken from home to hospital (minutes)

The mean distance from home to hospital was 13.32 km, with a maximum of 60 km and a minimum of 1 km. The majority of participants (n= 105) lived close to the hospital, while 3 participants lived more than 51 km away from the hospital. The mean time taken from home to hospital was 27.54 minutes, with a maximum of 180 minutes and a minimum of 2 minutes. Not surprisingly, there was a strong positive correlation between time taken and distance from home to hospital [r = .891, n = 200, p < 0.0005].

Factors associated with the performance on ATT19, DKN and DTSQ

One way to assess the importance of the findings in this study is to calculate indices of the 'effect size' or 'strength of association' (Pallant, 2001). These statistics indicate, for example, the relative magnitude of the differences between means. There are a number of different effect size statistics, the most common of which are eta squared. Eta squared represents the proportion of variance of the dependent variable that is explained by the independent variable. Cohen (1988) classifies .01 as a small effect, .06 as a medium effect and .14 as a large effect.

ATT19

Independent groups t-tests were used to compare the performance on ATT19 between males and females and the performance on ATT19 between participants using tablets and participants using insulin. There was no statistically significant difference in ATT19 scores between participants using tablets (N = 173, mean score = 36.27, SD = 14.33), and participants using insulin (N = 27, mean score = 40.22, SD = 14.50, t (198) = -1.33, p = .184). The magnitude of the differences in the means was very small (eta squared = .0009). There was, however, a statistically significant difference in ATT19 scores between males (mean score = 54.80, SD = 5.62) and females (mean score = 30.47, SD = 10.67) (Table 3.14). The eta squared statistic was (.55) indicated a very large effect size.

Table 3.14: The performances of ATT19 between males and females

	Gender	Mean scores	t	df	p-value
Performance on ATT19	Male (N = 52)	54.80	15.68	198	< 0.0005
	Female (N = 148)	30.47			

Table 3.15: The performance on ATT19 between groups in each variable

	Performance on ATT19			F	df	p-value
		N	Mean scores			
MARITAL STATUS	Single	8	49.00	4.19	3, 196	.007
	Married	136	36.63			
	Divorced	16	42.75			
	Widowed	40	32.55			
Age	19 – 39	24	48.67	10.15	2, 197	<.0005
	40 - 69	153	35.14			
	70+	23	35.43			
BMI	Lowest through 26.40	143	36.29	1.49	2, 197	.230
	26.41 – 27.80	24	34.67			
	27.81 – 46.00	33	40.54			

Table 3.15: The performance on ATT19 between groups in each variable (continued)

	Performance on ATT19			F	df	p-value
		N	Mean scores			
Occupation	Pensioners	104	33.33	33.79	2, 197	<.0005
	Professionals	29	54.34			
	Manual workers	67	34.59			
Education	None	26	23.96	106.64	4, 195	<.0005
	Primary School	119	30.87			
	Secondary School	15	53.73			
	High School	15	56.93			
	College	25	56.16			
Distance From home to hospital (km)	Lowest through 10	105	37.62	.24	2, 197	.785
	11 - 20	56	36.11			
	20+	39	36.31			
Time taken from home to hospital (min)	<30 min	49	37.84	.17	2, 197	.845
	31 - 60	107	36.43			
	>61 min	44	36.54			

Participants were divided into four groups according to their marital status: single; married; divorced; widowed. There was a statistically significant difference in ATT19 scores for the four groups [F (3, 196) = 4.19, p = 0.007]. The eta squared was .06, which would be considered as a medium effect. Post-hoc comparisons using the Turkey HSD test indicated that the mean score for single participants was significantly different from widowed participants. The mean scores for married participants did not differ significantly from either the mean scores for divorced or single participants or widowed participants.

Participants were divided into three age groups: 19 – 39 yrs; 40 – 69yrs; 70+ yrs. There was a statistically significant difference in ATT16 scores for the three age groups [F(2, 197) = 10.15, p < .0005]. The eta squared value was .09, would be classed as a medium effect. Post-hoc tests using the Tukey HSD indicated that the mean score for participants aged between 19 – 39 yrs differed significantly from participants aged between 40 – 69 yrs and participants aged 70+ yrs, but there was no statistically significant difference between participants aged 40 – 69 yrs and participants aged 70+ yrs.

Participants divided into three groups according to their occupation: pensioners; professionals; manual workers. There was a statistically significant difference in ATT19 scores for the three occupation groups. The eta squared value was .2, which in Cohen's (1988) terms, would be considered as a large effect size. Post-hoc tests using the Tukey HSD indicated that the mean score for professional participants differed significantly from participants who were pensioners/housewives and those manual workers. Pensioner/housewife participants did not differ significantly from participants who were manual workers.

Participants were divided into five groups according to their educational background: none; primary school; secondary school; high school; and college/University. There was a statistically significant difference in ATT19 scores for educational background. The actual difference in mean scores between the five groups was very large. The eta squared value was .7. Post-hoc tests using the Tukey HSD indicated that the mean scores for the no education group and primary school group were statistically different from one another and these two mean scores also significantly differed from secondary school group, high school group and college/University group. However, the secondary school, high school and college/University group did not differ significantly from one another.

As can be seen from Table 3.15, there were no significant differences in ATT19 scores for the four BMI groups, for the three distance from home to hospital groups, or for three time taken from home to hospital groups. The eta squared statistic were .016, .002 and .009, indicating very small effect sizes.

In summary, when considered one-by-one, the following five variables were found to be significantly associated with ATT19 scores: gender, marital status, age, occupation and educational background.

Linear regression was used to find which of these five variables were *independently* associated with the performance on ATT19. It should be noted that stronger assumptions are now made about some of the independent variables that strictly are ordinal in nature, but which the regression treats as interval. Cohen & Cohen (1983) argue that regression is usually robust in this situation. Two factors, gender and educational background remained statistically significant (p < 0.0005) (Table 3.16). Thus the effect of marital status, occupation and age were probably mediated by a combination of educational background and gender. It turned out that occupation has significant associations with all other independent variable entered in the regression: educational background (Pearson χ^2(8) = 117.39, p < 0.005); gender (χ^2(2) = 18.97, p < 0.005); married status (χ^2(6) = 23.22, p < 0.005); and age (χ^2(4) = 24.69, p < 0.0005). Age was significantly associated with educational background (χ^2 (8) = 40.41, p < 0.005), but not associated with age (χ^2 (2) = 131, p = .52). Marital status is not significantly associated with either educational background (χ^2(12) = 20.62, p < 0.06) or age (χ^2(3) = 5.07, p < .116), but is strongly correlated with both age (χ^2(6) = 24.29, p < 0.0005) and occupation (χ^2(6) = 23.22, p < 0.001).

Table 3.16: Results of linear regression on ATT19 scores

Variable	Regression coefficient	Std. Error	Beta coefficient	t	Sig.
Gender	-16.661	1.188	-.510	-14.02	<.0005
Married status	.575	.561	.034	1.02	.306
Age	-.727	.777	-.034	-.93	.350
Occupation	.546	.516	.035	1.05	.291
Educational background	6.583	.469	.545	14.03	<.0005

DKN

Independent t-tests compared the performance on DKN between males and females, income and between the treatment groups: tablets and insulin. There was no statistically significant difference between the two treatment groups: tablet mean score = 8.07, SD 2.73 and insulin mean score = 8.89, SD = 3.09, t (198) = -1.41, p = .159). The magnitude of the differences in the means was very small (eta squared = .009). There was, however, a statistically significant difference between males and females, and between the two groups of income on DKN performance (Table 3.17). The magnitudes of the differences in the means between males and females, and between the two groups of income were very large (eta squared = .2 and .14).

Table 3.17: The performance on DKN of binary variables

Performance on DKN	**Gender**	**Mean scores**	**t**	**df**	**p-value**
	Male (N = 52)	10.44	7.712	198	< 0.0005
	Female (N = 148)	7.39			
	Income per month	**Mean scores**	**t**	**df**	**p-value**
	Upto £100 (N = 148)	7.50	-6.34	198	<0.0005
	£101 + (N = 52)	10.21			
	Treatment	**Mean score**	**t**	**df**	**p-value**
	Tablet (N = 173)	8.08	-1.41	198	.159
	Insulin (N = 27)	8.89			

Participants were divided into four groups according to their marital status: single; married; divorced; and widowed. There was a statistically significant difference in DKN scores among the four groups [F (3, 196) = 4.69, $p = 0.003$] (Table 3.18). The calculated eta squared was .07, which considered as a medium effect size. Tukey HSD post-hoc comparisons indicated only 2 pairwise differences significant, single versus married and single versus widowed.

Participants were divided into three age groups: 19 – 39 yrs; 40 – 69yrs; 70+ yrs. There was a significant difference in DKN scores for the four groups [F (2, 197) = 9.231, $p < 0.0005$]. The eta squared was .09, which was considered as a medium effect size. The only significant Tukey HDS post hoc comparison was between participants aged 19 – 39yrs and participants aged 40 – 69yrs.

Participants were divided into three groups according to their occupation: pensioner; professional; and manual worker. There was a significant difference in DKN scores for the three groups [F (2, 197) = 29.144, $p < 0.0005$]. The actual difference in mean scores between the three groups of occupation was very large, eta squared = .2. The significant Tukey HSD post hoc comparison were between professional participants and each of the other two groups.

Participants were divided into five groups according to their educational background: none; primary school; secondary school; high school; and college/university. There was a significant difference in DKN scores for the five groups [F (4, 195) = 66.58, $p < 0.0005$]. There was a very large difference in mean scores between these five groups. The eta squared was .6. The significant Tukey HDS post hoc comparisons were between participants with no educational background and each of the secondary school; high school; and college/university groups.

There were no significant differences in DKN scores for the four BMI groups, for the three distance from home to hospital groups, or for three time taken from home to hospital groups (Table 3.18). The eta squared statistics (.023, .002 and .007) indicated very small effect sizes.

Table 3.18: Performance of DKN between groups in each variable

	Performance on DKN			F	df	p-value
		N	Mean scores			
MARITAL STATUS	Single	8	11.25	4.69	3, 196	.003
	Married	136	8.05			
	Divorced	16	9.13			
	Widowed	40	7.63			
AGE	19 – 39	24	10.29	9.23	2, 197	<.0005
	40 - 69	153	7.80			
	70+	23	8.57			
BMI	Lowest through 26.40	143	8.13	1.45	2, 197	.236
	26.41 – 27.80	24	7.62			
	27.81 – 46.00	33	8.85			
Occupation	Pensioners	104	7.67	29.144	2, 197	<.0005
	Professionals	29	11.41			
	Manual workers	67	7.50			
EDUCATION	None	26	6.54	66.58	4, 195	<.0005
	Primary School	119	6.97			
	Secondary School	15	11.07			
	High School	15	11.93			
	College	25	11.72			
Distance from home to hospital (km)	Lowest through 10	105	8.10	.107	2, 197	.899
	11 - 20	56	8.25			
	20+	39	8.33			
Tme taken from home to hospital (min)	<30	49	8.02	.672	2, 197	.512
	31 - 60	107	8.08			
	>61	44	8.61			

Based upon the significant variables in these tests on DKN scores (Table 3.17 and 3.18) linear regression was used to find which variables were independently associated with the performance on DKN. Gender and educational background remained statistically significant ($p = 0.001$ and $p < 0.0005$, respectively) (Table 3.19). The effect of marital status, age, occupation and income were mediated by the combination of gender and educational background. It turned out that marital status was significantly correlated with gender [r = .14, n = 200, p = .04] and educational background [r = -.15, n = 200, p = .028]. Age was only significantly correlated with educational background [r = -.44, n = 200, p<.0005], but was not with gender. Occupation and income both were significantly correlated with gender (χ^2 (2) = 18.90, $p < 0.0005$; χ^2 (8) = 13.87, $p < 0.0005$) and educational background (χ^2 (8) = 117.39, $p < 0.0005$; χ^2 (4) = 65.99, $p < 0.0005$).

Table 3.19: Factors associated with the performance of DKN

Variable	Regression coefficient	Std. Error	Beta coefficient	t	Sig.
Gender	-1.25	.361	-.198	-3.47	.001
Married status	-1.30	.171	.004	-.077	.939
Age	.397	.329	.069	1.22	.225
Occupation	-1.96	.165	-.006	-.119	.905
Educational background	1.45	.158	.617	9.15	.0005
Income	.254	.400	.040	.633	.527

DTSQ

Independent t-tests were used to compare the mean scores on DTSQ performance between males and females and between the types of treatment groups: tablets and insulin. There were no statistically significant differences between the mean score for males (means score = 29.65, SD = 1.41) and females (mean score = 29.70, SD = 1.01, t

(198) = -.306, p = .760), or between the mean score for the group treated by tablets (mean score = 29.71, SD = 1.01) and the group treated by insulin (mean score = 29.56, SD = 1.60, t (198) = .691, p = .490). The magnitudes of the differences in the means between males and females, and between the two groups of treatment were very small (eta squared values = .005 and .002).

One-way between-groups ANOVAs revealed no statistically significant differences between groups of marital status, age, BMI, occupation, income, educational background, distance from home to hospital, time taken to get to hospital, or type of treatment.

Relationship between ATT19, DKN and DTSQ

The relationship between ATT19, DKN and DTSQ was investigated using Pearson product-moment correlation coefficients. DKN had a positive significant correlation with ATT19 [$\underline{r}$ = .74, $\underline{n}$ = 200, p<0.0005] and DTSQ [$\underline{r}$ = .195, $\underline{n}$ = 200, p < 0.0005]. However, ATT19 was not significantly correlated with DTSQ [$\underline{r}$ = .019, $\underline{n}$ 200, p = .784].

<u>Use of medicinal plants/herbs for diabetes</u>

One hundred and thirty seven participants (68.5 percent) admitted to using plants and/or herbs for their diabetes. Table 3.20 summarises certain aspects of their usage. Of these, only 14 percent (n= 19) were willing to give information about the usage to their diabetologist. Ninety three percent of the users (n = 128) said they had used plants/herbs for their diabetes daily in combination with the prescribed conventional treatment. Seventy six percent of the users (n= 105) reported that they obtained knowledge of these medicinal plant/herbs from private sources, such as through relatives and friends with and/or without diabetes.

Fifty-seven medicinal plants were mentioned as alternative treatment for diabetes (Table 3.21).

Table 3.20: Use of medicinal plants/herbs for diabetes mellitus

		Participants		Total
		Number	Percentage (%)	
Use of plants/herbs for diabetes	Yes	137	68.5	200
	No	63	31.5	
Use frequency	Everyday	128	93.4	
	Once/Week	5	3.7	
	Once/Month	4	2.9	
Informing diabetologist of the usage	Yes	19	13.9	
	No	118	86.1	
Knowledge of the usage	Private sources	105	76.6	
	Public sources	32	23.4	

Table 3.21: Complete list of identified plants treatments for diabetes mellitus

Thai name	Latin name	No. of times mentioned
Pha talai jon	*Andrographis paniculata*	95
Mara khi nok (Siamese Karela)	*Momordica charantia*	46
Boraped	*Tinospora crispa*	43
Yha nhaw maw (Cat's whisker)	*Orthosphon garndiflorus*	38
Yha whan (Sweet leaves)	*Stevia rebaudiana*	30
Tom ling	*Coccinia indica*	18
Phug plab	*Commelina benghalensis*	18
Ma wang ton	*Solanum sanitwongsei*	10
Sattabun (Blackboard tree)	*Alstonia scholaris*	10
Inthanin nam (Queens' flower)	*Lagerstroemia speciosa*	10
Kok khra-orm (Ballon vine)	*Cardiospermum*	9
Huahom (Onion)	*Allium cepa*	9
Khanun (Jack fruit)	*Artocarpus heterophyllus*	8
Mhon (Mulberry)	*Morus alba*	7
Krapoa (Sweet basil)	*Ocimum basilicum*	6
Paya raibai (Milk bush)	*Euphorbia tirucalli*	5
Fukthong (Pumpkin)	*Cucurbita maxima*	5
Hanuman prasan kay	*Schefflera leucantha*	5
Smor pipeg (Beleric myrobalan)	*Terminalia chebula*	5
Grajab dang (Roselle)	*Hibiscus sabdariffa*	5
Takai (Lemon grass)	*Cymbopogon citratus*	5

Table 3.21: Complete list of identified plants treatment for diabetes mellitus (Continued)

Thai name	Latin name	No. of times mentioned
Takai hom (Citronella grass)	*Cymbopogon nardus*	5
Kog grasoon	*Tribulus terrestris*	4
Haew moo (Nutgrass)	*Cyperus rotundus*	4
Thong pun chang	*Rhinacanthus nasutus*	4
Komfoy (Safflower)	*Carthamus tinctorius*	4
Matoom (Bael fruit)	*Aegle marmelos*	4
Pun ngoo	*Achyranthes asper*	4
Makham pom (Emblic myrobalan)	*Phyllanthus emblica*	4
Phangpaew pharang	*Catharanthus rosus*	3
Sak (Teak tree)	*Tectona grandis*	3
Chaplu	*Piper sarmentosum*	3
Ong-grab	*Barleria strigosa*	3
Mi-ya-rap	*Minosa pudica*	3
Sadao India (Nim tree)	*Azadirachta indica*	3
Toa kun	*Parthenocissus quinquefolia*	3
Paksean phie (Polanisia vicosa)	*Cleome viscose*	2
Khamin chan (Turmeric)	*Cureuma longa*	2
Buw bok (Tiger herbal)	*Centella asiatica*	2
Book Erok khaw (Konjac)	*Amorphophallus campanulatus*	2
Khilek (Cassod tree)	*Cassia siames*	2
Kratium (Garlic)	*Allium sativum*	2

Table 3.21: Complete list of identified plants treatment for diabetes mellitus (Continued)

Thai name	Latin name	No. of times mentioned
Khing (Ginger)	*Zingiber officinale*	2
Kha (Chinese ginger)	*Alpinia nigra*	2
Hya Ngaungchang	*Heliotropium indica*	2
Rangjead	*Thunbergia laurifolia*	1
Hang jawrakea	*Aloe vera*	1
Nguak plamuh (Sea Holley)	*Acanthus ebracteatus*	1
Kamaeng	*Eclipta prostrata*	1
Bai Toei	*Pandanus odorus*	1
Mawang krea	*Solanum trilobatum*	1
Pharang (Guava)	*Psidium guajava*	1
Luk tai bai	*Phyllanthus amarus*	1
Gra-chay	*Boesenbergia rotunda*	1
Mang-lug (Hairy basil)	*Ocimum basillicum*	1
Hnong tay-hyag	*Stemona tuberosa*	1
Lukmark sod (Betel palm)	*Areca cathecu*	1

Characteristics discriminating between users and non-users of medicinal plants

Chi-square tests were used to distinguish characteristics of users of medicinal plants and non-users. There were no statistically significant differences in nationality (Thai *vs* Chinese), marital status, BMI, duration of diabetes, types of conventional treatment and time/distance from home to hospital. There were significant differences, however, in gender, age, occupation, educational background and income (Table 3.22).

Table 3.22: Different characteristics between users and non-users of medicinal plants

<table>
<tr><th colspan="2" rowspan="2">Characteristics</th><th colspan="2">Users (n= 137)</th><th colspan="2">Non-users (n= 63)</th><th rowspan="2">Chi-square</th><th rowspan="2">df</th><th rowspan="2">p-value</th></tr>
<tr><th>Number</th><th>Percentage</th><th>Number</th><th>Percentage</th></tr>
<tr><td rowspan="2">Gender</td><td>Male</td><td>17</td><td>12.4</td><td>35</td><td>55.6</td><td rowspan="2">39.54</td><td rowspan="2">1</td><td rowspan="2">< .05</td></tr>
<tr><td>Female</td><td>120</td><td>87.6</td><td>28</td><td>44.4</td></tr>
<tr><td rowspan="3">Age</td><td>19 – 39</td><td>6</td><td>4.4</td><td>18</td><td>28.6</td><td rowspan="3">23.92</td><td rowspan="3">2</td><td rowspan="3">< .05</td></tr>
<tr><td>40 – 69</td><td>114</td><td>83.2</td><td>39</td><td>76.5</td></tr>
<tr><td>70+</td><td>17</td><td>12.4</td><td>6</td><td>9.5</td></tr>
<tr><td rowspan="2">Income (£)</td><td>Upto £100</td><td>121</td><td>88.3</td><td>27</td><td>42.9</td><td rowspan="2">46.13</td><td rowspan="2">1</td><td rowspan="2">< .05</td></tr>
<tr><td>£101+</td><td>16</td><td>11.7</td><td>36</td><td>26.0</td></tr>
<tr><td rowspan="3">Occupation</td><td>Pensioners</td><td>83</td><td>60.6</td><td>21</td><td>33.3</td><td rowspan="3">66.52</td><td rowspan="3">2</td><td rowspan="3">< .05</td></tr>
<tr><td>Professionals</td><td>1</td><td>0.7</td><td>28</td><td>44.4</td></tr>
<tr><td>Manual workers</td><td>53</td><td>38.7</td><td>14</td><td>22.2</td></tr>
<tr><td rowspan="5">Education</td><td>None</td><td>24</td><td>17.5</td><td>2</td><td>3.2</td><td rowspan="5">165.04</td><td rowspan="5">4</td><td rowspan="5">< .05</td></tr>
<tr><td>Primary school</td><td>113</td><td>82.5</td><td>6</td><td>9.5</td></tr>
<tr><td>Secondary school</td><td>0</td><td>0</td><td>15</td><td>23.8</td></tr>
<tr><td>High School</td><td>0</td><td>0</td><td>15</td><td>23.8</td></tr>
<tr><td>College/ University</td><td>0</td><td>0</td><td>25</td><td>39.7</td></tr>
</table>

Independent group t-tests compared the performance on ATT19, DTSQ and DKN between users and non-users of medicinal plants (Table 3.23). On the DTSQ, there was no statistically significant difference between users (DTSQ mean score = 29.64, SD = 1.24) and non-users (DTSQ mean score = 29.83, SD = 0.81) of medicinal plants. The magnitude of the differences in the means was very small (eta squared = .006). There were, however, significant differences between users and non-users of medicinal plants on ATT19 and DKN performance. Users of medicinal plants had significantly lower mean scores on both ATT19 (mean score = 29.37, SD = 9.12) and DKN (mean score =

6.94, SD = 1.82) than non-users of medicinal plants (ATT19 mean score = 52.95, SD = 9.69, DKN mean score = 10.89, SD = 2.55). The actual differences in the mean scores between users and non-users on both performances were very large (eta squared vales = .58 and 43).

Table 3.23: The performance of ATT19, DTSQ and DKN between users and non-users of medicinal plants

Scales	Mean score		t	df	*p*-value
	Users (N= 137)	Non-users (N= 63)			
ATT19	29.37	52.95	-16.65	198	<0.0005
DTSQ	29.64	29.83	-1.11	198	.268
DKN	6.94	10.89	-12.32	198	<0.0005

The problem with using separate statistical test for each predictor variable, as shown in Table 3.22 and 3.23, is that these predictors are unlikely to be independent of one another. Using the significant factors (Table 3.22 and Table 3.23), logistic regression was used to find how many of these factors were independently associated with the users of medicinal plants for diabetes (Table 3.24). The model retained only 1 out of 7 factors; DKN was significant (p = .032) with odds ratio = 0.547 (Table 3.24). Participants with high diabetes knowledge scores were less likely to be users of medicinal plants.

Table 3.24: Factors associated with users of medicinal plants for diabetes

Variable	Wald χ^2	df	Sig.
Gender	.066	1	.798
Age	.389	2	.273
Income	.007	1	.782
Educational background	2.021	4	.732
Occupation	4.032	2	.133
ATT19	1.143	1	.285
DKN	4.618	1	.032

Model Summary: Cox&Snell R^2 = 6.37; Nagelkerke R^2 = .894

It is not surprising that the other factors listed in Table 3.24 were not significant predictors of medicinal plant usage independent of DKN scores, since gender, age, educational background, and ATT19 scores were all associated with DKN scores (Table 3.17, 3.18 and 3.19). A picture emerges of young males who are likely to have higher levels of education and to be more knowledgeable about diabetes are less likely to be users of medicinal plants.

DISCUSSION

Sixty eight percent of participants admitted that they used herbal medicine for diabetes and its complications. The rates for this sample are higher than those reported for users of complementary medicine within a diabetes clinic in the UK (17 percent, Leese et al., 1997), for users of alternative treatments in a national survey of English-speaking adults (34 percent, Eisenberg et al., 1993), for users of bush medicines in Trinidad and Tobago (42 percent, Mahbir and Gulliford (1997), for South Texas

Leese et al., 1997), for users of alternative treatments in a national survey of English-speaking adults (34 percent, Eisenberg et al., 1993), for users of bush medicines in Trinidad and Tobago (42 percent, Mahbir and Gulliford (1997), for South Texas diabetic out-patients (49 percent, Hitchcock Noel, et al. (1997), but lower than that reported from Thailand by Reawpibol, 1991 (84 percent)). A number of socio-demographic variables (gender, age, occupation, educational background and income) plus attitude toward diabetes and knowledge of diabetes were associated with usage of medicinal plants in this sample. Logistic regression was used to develop a multivariate model, which indicated that *typical users* are those patients who have less knowledge of diabetes. It is noticeable that large numbers of users were females with a low educational level. Gender, within this sample, influenced the level of educational attainment and presumably the level of education in turn influenced attitudinal and diabetes knowledge variables.

Despite an encouragement to bring back the usage of medical plants for various illnesses in Thailand in 1988 as a safe and cheap alternative to pharmaceuticals (LeGrand et al., 1993), only 14 percent of users were willing to discuss their usage of medicinal plants with their physicians. This suggests that patients believe that physicians may not approve the usage of non-orthodox treatment. The knowledge of plants' beneficial properties is generally passed down through the generations and is widely shared within and around the community. Participants tended to use one or more plants daily in combination with the prescribed orthodox medicine.

Patients in this study reported using 57 different plants to treat their diabetes. The most commonly used traditional plant was *Andrographis paniculata* (The creat or Pha talai jon). Oral administration of the aerial part of this bitter tasting plant significantly increased body weight and reduced fasting serum glucose in streptozotocin-induced diabetic rats (Zhang and Tan, 2000a & 2000b). There is, however, no scientific evidence to support this beneficial effect in any controlled human trial.

The second most commonly identified plant treatment was *Momordica charatia* (Siamese karela or bitter melon), which is the member of CUCURBITACEAE family and the fruit has a bitter taste. The size of Siamese karela is very much smaller than the karela fruit, which used as the treatment of diabetes in India. Drinking karela juice improved the glucose tolerance of 73 percent of NIDDM patients (Welihida et al., 1986), and drinking 50ml extract from the fruit and eating karela fried (0.23 kg) for 8 – 11 weeks improved glucose levels and glucose tolerance, and led to a fall in glucosylated Hb in nine diabetic patients (Leatherdale et al., 1981). The effect of karela was also demonstrated in 100 NIDD patients (Ahmed et al., 1999). Drinking an aqueous homogenised suspension of the vegetable pulp of karela significantly reduced both glucose levels and post-prandial serum glucose levels in 86 NIDD patients.

Tinospora crispa (Boraped) is the third most frequent identified plant, which has been known as a diabetes remedy since antiquity. The hypoglycaemic component is within the stem, which also tastes very bitter. Its beneficial effect was demonstrated in non-diabetic and alloxan-induced diabetic rats (Noor and Ashcroft, 1989). Oral administration of an aqueous extract of *T. crispa* stem showed improvement in glucose tolerance after 2 weeks treatment and intravenous 50 mg/kg body weight extract caused an increase in plasma insulin levels.

Little is known about the fourth most mentioned plant *Orthosphon garndiflorus* (Cat's whisker). The knowledge of its hypoglycaemic effect is passed down through generations, but no scientific evidence/support found was found in a Medline search.

The fifth most mentioned plant was *Stevia rebaudiana* (Sweet grass). *S. rebaudiana* has been used traditionally to treat diabetes (Leung and Foster, 1996). Early reports suggested that *S. rebaudiana* might have beneficial effects on glucose tolerance and therefore potentially help with diabetes (Curi et al., 1986), although not all reports have confirmed this (White et al., 1994). Jeppesen et al. (2002) demonstrated the effect of *S. rebaudiana* in NIDDM-induced rats. Injections of 0.2g/kg body weight of *S. rebaudiana* suppressed the glucose response to a glucose tolerance test in NIDD rats and concomitantly increased the insulin response. In normal rats, *S. rebaudiana* enhanced insulin levels above baseline during the glucose tolerance test without altering blood glucose response or glucagons levels.
Even if *S. rebaudiana* did not have direct anti-diabetic effects, its use as sweetener could reduce intake of sugar in diabetic patients. In Japan, *S. rebaudiana* accounts for nearly 40 percent of the sweetener market and is commonly used in various part of South Africa.

CONCLUSION

The present study indicates that a high percentage of patients with diabetes in Thailand have used medicinal plants for their diabetes. The 'typical' user is an older female patient with no or low educational background, low income (where conventional treatment may be unaffordable to them), and had poor (low) scores on diabetes knowledge and psychological assessment questions. Gender significantly influenced the level of educational attainment, and such educational attainment significantly mediated the performance of both attitudinal and diabetes knowledge scales, and thus the lower the diabetes knowledge score the more likely being a user. Attitudinal and diabetes knowledge scales were strongly and positively correlated with one another. The five most commonly reported treatments were: *Andrographis paniculata*; *Momordica charantia*; *Tinospora Crispa*; *Orthosiphon garndiflorus* and *Stevia rebaudiana*. Very little, however, is known about their efficacy or side-effects but given their high levels of use, these five should be targeted for further investigation.

Finally, the use of attitudinal and diabetes knowledge assessments proved reliable for this sample, but the treatment satisfaction scale less so.

CHAPTER FOUR

BRITISH INDO-ASIANS WITH DIABETES: THEIR ADHERENCE AND USE OF MEDICINAL PLANTS

INTRODUCTION

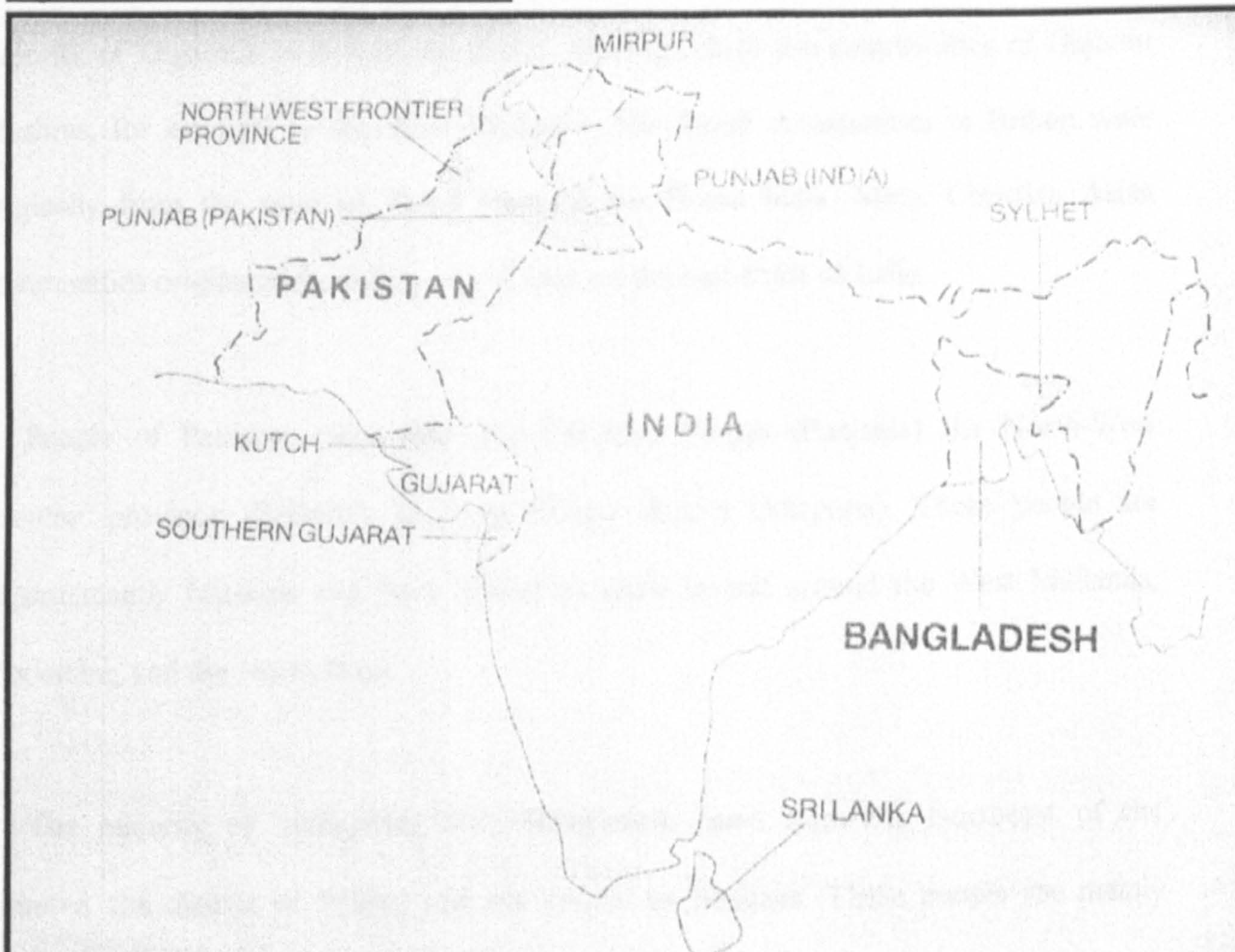
This section introduces an overview of the origins of the main Indo-Asian community and of which group and why people came to Britain, and a brief outline of the religions and main languages spoken in Britain. A rationale for research is included.

ORIGINS OF BRITISH INDO-ASIANS

The word 'Indo-Asian' or 'South Asian' in Britain represents a variety of communities and individuals, originating from the Indian subcontinent countries: India, Pakistan, Bangladesh and Sri Lanka. They are fundamentally different in terms of culture, beliefs, languages, religion, social class, politics, and many other factors, all of which may influence responses to the delivery of health-care services. Understanding these factors is no guarantee for successful health-care delivery, but it can help to create awareness of the range of factors to be taken into account in planning, providing and improving an appropriate and equitable service.

Indian people have migrated to other lands for many centuries. The modern history of Indian emigration dates from the beginning of the colonial system of indentured labour in 1834 (Kondapi, 1951; Tinker, 1974). Since partition in 1947 and the war of independence in East Pakistan (now Bangladesh), the Indian subcontinent consists politically of India, Pakistan, Bangladesh and Sri Lanka. Indo-Asian people who migrated either to East Africa or Britain tended to come from a few main areas (Figure 4.1).

Figure 4.1 The Indian Subcontinent



INDIA		PAKISTAN		BANGLADESH	
Punjab	- Punjabi	Punjab	- Punjabi	Sylhet	- Sylheti (dialect)
Gujarat	- Gujarati	Mirpur	- Mirpuri		
(Kutch)	- Kutchi (dialect)	North West Frontier	- Pashto		

In the mainland of India, Punjab and the state of Gujarat were the places from which people migrated to Britain. Since 1947 Punjab has been divided into two parts – the Indian Punjab and the Pakistani Punjab. Punjabis in India are mainly Sikh, and those from the Pakistani Punjab are predominantly Muslims. The state of Gujarat on the west coast of India has also had a tradition of migration, especially to East Africa. Many 'Asians' in Britain were originally from Gujarat state. They are known as Gujaratis, and are mainly settled in the South East and Midlands of England. They tended to come from two areas of Gujarat: the northern area (Kutch) and the southern (Gujarat). The majority of Gujaratis in Britain are Hindu, although there are communities of Gujarati Muslims, for example in the West Midlands. The Tamil communities in Britain were originally from the state of Tamil Nadu in the South India. Many Christian Asian communities originated from the state of Goa on the east coast of India.

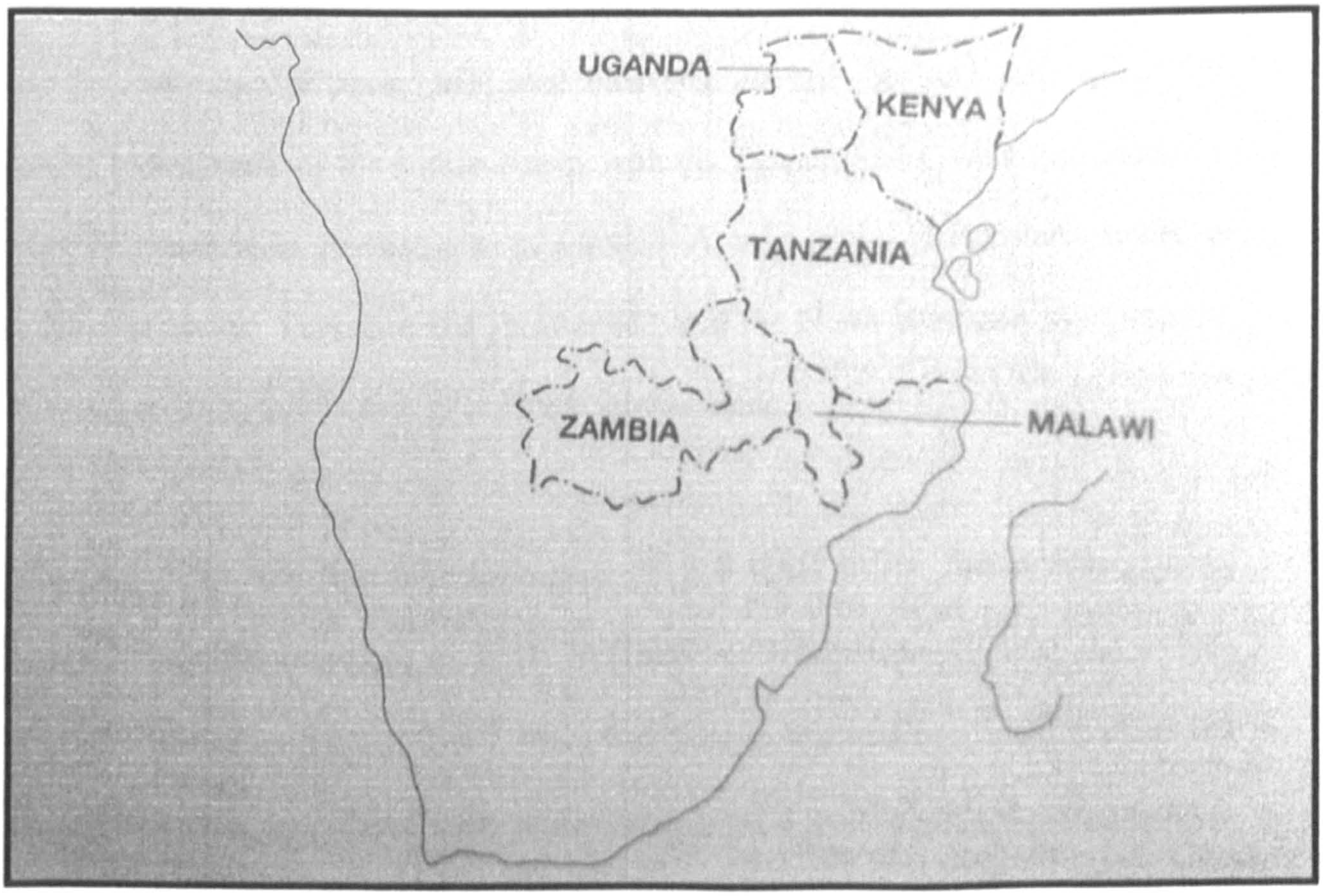
People of Pakistan came from the Pakistani Punjab (Punjabis) the North-West Frontier province (Pathans), or from Mirpur district (Mirpuris). These people are predominantly Muslims and have tended to settle in and around the West Midlands, Yorkshire, and the North West.

The majority of immigrates from Bangladesh came from the Northeast of the country, the district of Sylhet, and are known as Bengalis. These people are mainly Muslims and the majority have settled in the South East of England, the largest community being in the London borough of Tower Hamlets.

There are also Asian communities in Britain, who originated from East Africa- mainly from Uganda, Kenya, Tanzania, Malawi and Zambia (Figure 4.2). These people originated from the Punjab and Gujarat states of the Indian subcontinent. They then migrated to Britain and have settled in the South East and the West Midlands. Those of Gujarati origins are mainly Hindus (some Muslims), and those of Punjabi origins are Hindu, Sikh, and Muslim.

There are some Asian communities in Britain, mainly Hindus and Muslims, who originated from the Caribbean, mostly from Trinidad and Guyana.

Figure 4.2. Areas of East African Asians migrated into Britain



Reasons for migration

The migration of the Asian people from the Indian subcontinent and from East Africa to Britain occurred after the 2nd World War in response to post-war labour shortages in Britain. This migration happened for various reasons, including social, economic and politic factors.

First, migration was a response to labour shortages in Britain after the 2nd World War. This shortage in labour happened mainly in manual jobs and shift work. The majority of members of the Indian Army, typically Punjabi Sikhs, went into industrial works, for example in Southall area of London. A large group of Pakistanis settled in the West Midlands, Yorkshire and Humberside, and the North West and went into the textile industries as a reflection of post-war job vacancies.

Second, there was lack of employment in rural areas in the Indian subcontinent, stemming from the partition, in 1947. Migrants to Britain from Gujarat and Punjab came from rural areas (Rose, 1969). Most had been agricultural or manual workers but their literacy rate was higher than that of the general population (McKeigue et al., 1988). For instance, a large group of Mirpuris were given priority for migration, and whole communities from that area migrated to Britain, and resettled in the West Midlands and Yorkshire. The pattern of migration during this time mainly involved men arriving initially to work, and then later they were followed by their wives, dependents and relatives.

Finally, in contrast to those two reasons, a migration to Britain from East Africa was due to political factors. Most Indo-Asians settled in the main town and cities of East Africa mainly Gujarati and Punjabi in origin, were usually self-employed persons or working in the professions and civil services. In the early 1960s, East African governments embarked on a programme of 'Africanization', which, among other things, gave preference in employment to Africans. East African Asians, especially those who held British citizenships were mostly restricted to particular life-styles and employment. Eventually, in the most extreme case, Uganda, in 1972, all Ugandan Asians holding British passports were expelled in the space of three months. These people migrated into Britain and have resettled mainly in the South East and in the East and West Midlands.

Migration from the Caribbean was also influenced by political and economic reasons. Though the situation was not as unstable as that for the Asians in East Africa. Asian communities in Caribbean were also of a low order of importance. Tamils from the state of Tamil Nadu in South India settled in Britain predominantly after the 2nd World War, typically in response to labour shortages, whilst the migration of Tamil from Sri Lanka was stemmed from the unstable political and religious issues between Tamil minority and the Sinhalese majority.

Migration into Britain from the Indian subcontinent increased after 1960 and reached a peak around 1966-1967 (Lomas, 1974). However, it became increasingly restricted since 1968. In 1971, Immigration Acts for primary immigration (especially for those people coming mainly for work) and secondary immigration (of relatives and dependents) were brought out and migration into Britain has declined since then.

Religion

This section provides brief information on each religion practised by the majority of British Indo-Asians.

There are three major religions practised by the majority of Indo-Asians living in Britain: Hindu, Islam (Muslim) and Sikhism. Like Buddhism, each of these religions are perceived and practised by various groups in different ways for various reasons. The implications of adherence to a particular religion are varied and complex, and are perhaps best understood on an individual basis.

Hinduism

Hinduism involves a belief in Gods, who can be worshipped in many different ways. There are three important gods: Brahma (the creator), Vishnu (the preserver) and Shiva (the destroyer). One of the main sects in Britain, with communities in the South East and North West, is the Swami Narayan. They believe in non-violence and the idea of a never-ending cycle of creation and destruction - *reincarnation*. Reincarnation is the cycle of birth and rebirth, based on the belief that all persons are responsible for their own actions, and will be reborn again and again until their lifestyles raise them above the cycle of rebirth and unite them with God. Condition and status in each life is believed to be determined by behaviour in the previous life.

The belief of reincarnation is also associated with the social caste system. Hindu society consists of four major castes: (1) the Brahmins (priests), (2) the Kshatriyas (warriors), (3) the Vaisyas (farmers and merchants) and (4) the Sudras (labours and servants).

There is a fifth group of outcastes (untouchables). This caste system forms a rigid social structure amongst the Hindus in Indian society. The Indian government outlaws caste discrimination. However, the system is deeply rooted with strong religious connotations. Each caste group is composed of people from a particular social and occupational group and geographical origin. They tend to share social events, place or a common sub-caste name together.

Sikhism

Sikhism developed in the Sixteenth century as a reformist movement of Hinduism, and was founded by Guru Nanak. The belief is also based on one God, with the emphasis on a personal relationship with, and the worship of, God. The teaching is based on the teachings of ten Gurus, and the Sikh holy book is the *Guru Granth Sahab*, which is a collection of the writings of the ten Gurus. Sikhs also believe in reincarnation, but not in the caste system. Sikhs believe that everyone should have equality. Theoretically, this may sound different from the Hindus' caste system. There is, however, a caste reflection in Sikh lifestyle as well, typically in marriage patterns and the selection of a temple. The temple is a centre place for the whole community for social events, meetings and for worship to God. Each temple has a kitchen, which provides communal food to their visitors.

There are five signs of Sikhism:

- Kara – a metal bangle which is usually not removed, worn by men or women;
- Kesh - Uncut hair;
- Kangha – the comb used to secure long hair under a turban

- Kirpan – a small symbolic dagger;
- Kaccha – a sacred under-garment

There is a special devotion in Sikhism. The person devoted to Sikhism wears these five signs of Sikhism (known as '*Amrit Dari*'), does not eat meat, and attends the temple everyday. The last Sikh Guru ordered all Sikh not to use a sub-caste name, but to use the title *Singh* (for men), and *Kaur* (for females), in an attempt to alter the caste system and promote equality.

Islam

The prophet Muhammad founded Islam at the beginning of the seventh century, in the Middle East. Muslims believe in only one God called *Allah*, and believe that Muhammad was the last messenger of God. They believe that Muhammad was instructed by God to lay down specific rules about spiritual, physical and community life of Muslims in the form of a holy book, known as *the Koran*.

Like Buddhism, differing interpretations and explanations lead to the development of different sects, which have slight changes in practices, beliefs and approaches to life. These differences led to two main sects in Islam: (1) the Sunni Muslims and (2) the Shia Muslims. Most Pakistani and Bangladeshi Muslims belong to the Sunni sect, while most Muslims from India, especially from Gujarat state, belong to the Shia sect.

The Koran is written in Arabic. All Muslims are encouraged to learn Arabic in order to read the Koran. Muslim children go to mosque school in the evenings and at the weekend to read and study the Koran. Mosques provide a centre for communal worship, as well as classes, services, social events and meeting for the Muslims.

Devout Muslims should follow five main pillars of Islam:

1. Faith in God and his messenger Muhammad and *only* God is to be worshipped;
2. Prayer – all Muslims should pray formally five times a day: first, before sunrise, second and third, in the early and in the late afternoon, fourth, just after sunset, and fifth, during the night. Ritual washing should take place before each praying, which should be said with the head towards Mecca. Friday is a holy day and most prayers, especially men, will have a congregational pray at the mosques (Hawthorne, 1990);
3. Charity – every Muslim is expected to give money, whenever possible, especially to the poor;
4. Fasting – all Muslims are expected to fast throughout the day during the Ramadan period. Ramadan lasts approximately one month, and fasting should take place from dawn to dusk. The date of Ramadan is not fixed; the daily period of fasting can be long in Britain, especially when it occurs in the summer months. The rules can be flexible, typically for those who are ill or children at very young age.
5. Visiting pilgrimage – all Muslims aim to make a pilgrimage to visit Mecca- the holy city- at least once in their lifetime. Anyone who completes a pilgrimage can honourably add the title *Hajji* to his or her name.

Language

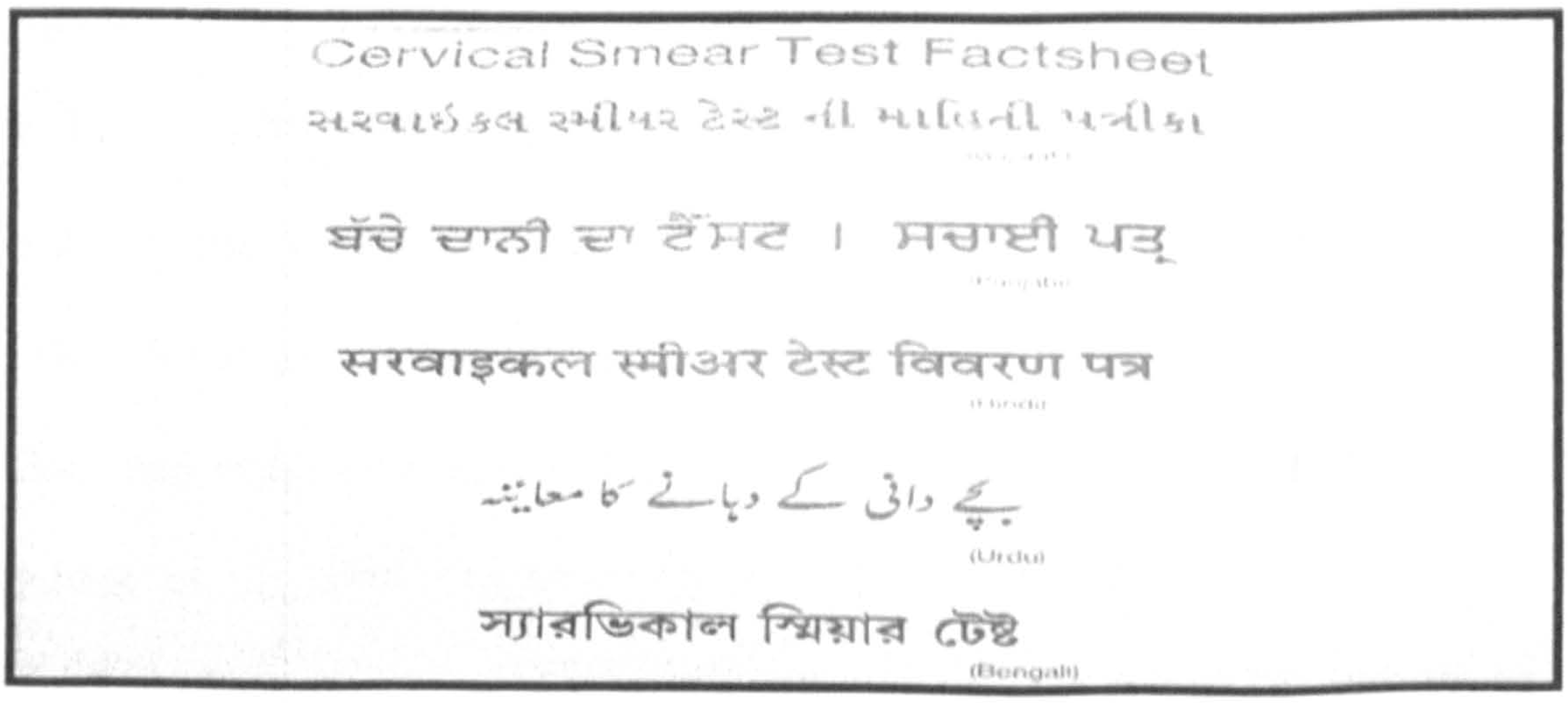
A number of languages and dialects are spoken in the Indian subcontinent. The main languages spoken in Britain are Gujarati, Punjabi, Bengali, Pashto, Hindi and Urdu. These languages belong to the Northern Indian group. For example, the Gujaratis from the Kutch area may speak Kuchi, a dialect of Gujarati. Mirpuris from Mirpur may speak Mirpuri, a dialect of Punjabi. Bengalis from the Sylhet district of Bangladesh may speak Sylheti, a dialect of Bengali. East African Asians will usually speak English, which was the administrative language of East Africa, and the language of the area of the Indian subcontinent from which they originated, mainly Gujarati or Punjabi.

A small Asian community of Tamil from the Southern Indian state of Tamil Nadu, Sri Lanka, and the Kokni Muslims from the state of Maharashtra, all speak Kokni. Most Asians can speak more than one language. Though there are vocabulary and pronunciation differences between Hindi (national language for Indians) and Urdu (national language for Pakistanis), people from the two countries can communicate and understand each other well.

The written forms of Asian languages also vary widely (see Figure 4.3). The three main languages used in India are each written in its own scripts. Punjabi is written in *Gurmukhi* script, Gujarati and Hindi are written in *Devanagri* script. The Pakistani languages (Urdu, Punjabi, Pashto), which is read from left to right, are all written in *Arabic* script. Bengali is written in *Devanagri* script, but in very different form to that used for Gujarati and Hindi.

It is suggested that the variety and complexity of Asian languages should be taken into account in any situation requiring an interpreter; hence professional interpreters should only be used rather than *ad hoc* interpreters (Taylor, 1990). The majority of first-generation Asian women cannot speak or understand English (Mello, 1992). In a study in Coventry (Simmons et al., 1989), it was found that 25 percent of the Asian women interviewed could not read any language and were totally dependent on family members for health information. It is well known that many first generation Asians used a relative, husband or in some cases a young child, who has been taught English at school, as an interpreter during consultation with the medical staff (Young, 1997). The use of family members causes some concern, especially with children if the child is quite young, as he or she may not understand medical terminology, and intimate questions may cause embarrassment to all parties (Karsras and Hopkins, 1987). The need for professional interpreters is now recognised by many health authorities. In recent years the NHS has appointed more bilingual medical and administrative staff as well as advocates and link-workers (Baylav, 1996). The use of Asian link-workers has proved to be satisfactory, especially as a bridge between doctors and Indo-Asian patients from different cultures (Levenson and Gillam, 1998). It is preferable that the link-workers should be non-medical employees, but fluent in the appropriate language(s) and familiar with the cultural and religious beliefs of the target population.

Figure 4.3. Example of different Asian languages and scripts



With acknowledgement to McAvoy (1990) p. 152

Rationale for the research

Type II diabetes mellitus (NIDDM) affects approximately 2 percent of the British population (O'Rahilly and Savill, 1997). This incidence seems even more prominent among people of Indo-Asian (India, Pakistan and Bangladesh) origin living in the UK. It is suggested that NIDDM is three to six times more common among this ethnic minority (Mather and Keen, 1985, Simmons, 1991; Primatesta and Brookes, 1999). The reason for the escalating prevalence of diabetes is that people are becoming more overweight and less active (UKPDS, 1995). In the general population, obesity is now confirmed as a major risk factor for the development of diabetes. Those with body mass index (BMI) greater than 28 are especially at risk (UKPDS, 1995). However, this does not seem to be a plausible cause for the high prevalence of NIDDM in British Indo-Asians. There are numbers of hypotheses for the high incidence of NIDDM within this group (discussed in more detail in Literature Review). Central obesity, the consequence of life-style change after immigration may trigger insulin resistance, contributing to the high incidence of NIDDM among this group.

Evidence has emerged also that males and females with diabetes, originating from the Indian subcontinent, had death rates approximately twice as high from CVD (cardiovascular disease) and three times as high from ischaemic heart disease compared to the general population of England and Wales (Chatuverdi and Fuller, 1996). British Indo-Asian males especially had a higher incidence of end-stage renal disease (ESRD) (Burden et al., 1992; Lightston et al., 1992). Research has shown that intensive treatment of blood glucose levels could reduce the risk of diabetes complications

(UKPDS IV, 1988). To achieve the best possible outcomes health information about these risks needs to be shared between the health providers and patients and, also with the patient's family. However, many British Indo-Asian diabetics and/or their family have language difficulties, which can make imparting ideas and information difficult. Ethnic minority patients might sometimes be perceived as being 'awkward' because they do not comply with professional advice because they do not understand what is being said, or if they cannot eat offered food or take recommended medication for religious or cultural reasons, or if they were to use other form of treatment, i.e., traditional medicinal plants, either in conjunction with or instead of conventional medicine. It is widely recognised that British Indo-Asians, especially those of first-generation, experience difficulties with language when requiring health care services. A large percentage of first-generation Asians, especially women, cannot speak or understand English (Levy et al., 1986; Mello, 1992). The poor health care in this ethnic Asian group is linked with the language barrier (Hawthorne, 1994).

Almost one-third of British Indo-Asian diabetics have admitted to using herbal remedies to treat their diabetes (Matthias et al., 1998). However, many of the herbal remedy users, especially the ones with low educational background, would tend to keep this usage secret from their medical providers (Part I-study: Preliminary study - Pisitchayakhon-Garnett's Thesis, 2000).

The main reason why people, in general, may turn to the use of unconventional treatment is because they are dissatisfied with the orthodox treatment, or they are experiencing a chronic illness or pain which is difficult to cure (Sharma, 1992). Communication barriers may not be the only factor influencing the daily management of diabetes and the decision to use medicinal plants. Health beliefs, perceptions and attitudes towards the disease may also be mediated by people's original culture and religious belief, especially in those whose educational attainment is limited (McAvoy and Donaldson, 1990).

This research was planned to:

- use literature to identify the factors, which might be contributors to non adherence and cause people to use unconventional therapeutic methods, in this case a use of medicinal plants, either in conjunction with or instead of conventional medicine;
- use the literature in health psychology to identify ways of measuring (1) attitudinal adjustment to having diabetes, (2) satisfaction towards recommended treatments, the health care team, information, advice and facilities, (3) self care activity to assess the extent to which these components might influence adherence and use of medicinal plants;
- develop a diabetes knowledge questionnaire to measure the level of the participants' knowledge, which may influence adherence with medical advice and use of medicinal plants;
- develop a structured questionnaire/interview schedule that enables answers to the relevant research questions to be sought;
- secure the commitment of three (or four) health care surgeries with high Indo-Asian population to applying the questionnaire to their white British and Indo-Asian diabetic patients;
- use responses to the interview schedule to assess the extent to which non-adherence and use of medicinal plants exist, and determine factors influencing these;

- use the outcomes of the research to inform health care organisations, especially those which deal with ethnic Indo-Asians, to encourage successful diabetes management.

The null hypothesis would be that there is no significant difference between usage of medicinal plants for diabetes in people born in the UK and those born in an Asian country (originating from India, Pakistan and Bangladesh) with diabetes, and no relationship between usage and components of communication difficulty, cultural and religious differences or the psychological measures and adherence.

The alternate hypothesis is that there are significant associations, implying that the British Indo-Asians with diabetes, whose languages, cultural background and religious beliefs differ from those born in the UK, experiencing communication difficulties and feeling isolated, will display unacceptable feelings to having diabetes and turn to the use of traditional medicinal plants to treat their diabetes.

LITERATURE REVIEW

This section sets out to review the most relevant aspects of the literature on diabetes. The primary focus of the thesis is on diabetes in Asian populations, especially in British Indo-Asians who originated from India, Pakistan and Bangladesh. Key issues regarding diabetes care in this group relate to the observation that rates of NIDDM (Non-Insulin Dependent Diabetes Mellitus) are higher in British Indo-Asians than in White British people, that this imbalance seems not to appear in Asians in their home countries (India, Pakistan and Bangladesh), and that it is most prominent in first generation British Indo-Asians, apparently dropping away in second and subsequent generations.

First, the review will discuss the types of diabetes mellitus according to current WHO classification, the prevalence of NIDDM and the hypotheses to the contributions of NIDDM among the British Indo-Asians. There is a great deal of evidence pointing to familial aggregation to NIDDM among British Indo-Asian people. A family history of NIDDM is more common in diagnosed British Indo-Asians compared to Europeans with diabetes. The British Indo-Asians with diabetes were genetically more centrally obese compared with the Europeans with diabetes. This genetic influence in many Indo-Asians with diabetes may be mediated through the insulin-resistance syndrome. A genetic component is, however not the only factor that is suggested to be a possible cause of NIDDM among the British Indo-Asian group. There are a number of environmental factors after immigration such as a sedentary lifestyle, obesity, small baby syndrome, poverty and stress, which are also suggested as contributions to the high prevalence of NIDDM in British Indo-Asians. This review will examine such environmental factors against the first hypothesis of genetic differences.

There is evidence that British Indo-Asian patients with diabetes have higher mortality and morbidity rates from cardiovascular and renal diseases (the complications of diabetes) than British Caucasians with diabetes. The prevalence of classic risk factors such as smoking, hypercholesterolaemia (high cholesterol in the blood) and hypertension (high blood pressure) are generally lower in British Indo-Asians than in the British Caucasians, which indicates that these risk factors do not account for the excess cardiovascular disease mortality in British Indo-Asians. Insulin resistance syndrome (glucose intolerance, raised plasma insulin, increased triglycerides, decreased high-density-lipoprotein and central obesity) was suggested as a plausible explanation for the high incidence of cardiovascular disease mortality in British Indo-Asians. This review will firstly discuss the above issue and other possible contributions that might link with the incidence of heart and renal diseases. Secondly, it distinguishes both demographic and biomedical characteristics of British Indo-Asian diabetics with complications. Finally, it will highlight the differences between this minority group with those of British Caucasians with diabetes, who suffering from the same complication.

A review of literature on diabetes care among the British Indo-Asians indicates that not just cultural and religious belief, but also communication barriers, mediate the way in which British Indo-Asians adjust to and access western health care system. This review will highlight and compare British Indo-Asians' beliefs about health illness and, treatment, especially the use of medicinal plants and to which they might turn to when facing a chronic illness such as diabetes, with the beliefs of those held by the British Caucasians.

Background

Diabetes is a common chronic condition which is causing major concern all over the world (Samanta, 1989). In the UK, around 1.4 million people have been diagnosed with diabetes (Boyle et al., 1998) and it is thought that at least a million more have it but do not know it yet (Forrest et al., 1986; Harris et al., 1987; Simmon, 1991). It is estimated that 20,000 people with the disease will die each year (British Diabetic Association (BDA) et al., 1993) and the number of people with the disease is escalating, both in the UK and worldwide (Gatling et al., 1985; Neil et al., 1987; Amos et al., 1997; Gatling et at., 1998).

Diabetes becomes more common as people get older. Diabetes is diagnosed with increasing frequency up to the age of 55, with the average age at diagnosis at 52 in people with no family history and 51 in people with a family history (UKPDS IV, 1988).

Men and women are, on average, equally likely to be diagnosed with diabetes (Diabetes UK, 2001), although that was not always the case - a slightly higher prevalence in women was seen in the 1950s and 1960s and, in the 1970s (UKPDS IV, 1988), and in the 1990s diabetes was more common in men (Primatesta and Brookes, 1999). Walters et al. (1994) believed that women with diabetes were more likely to die prematurely. This is because diabetes seemed to remove the natural protection against heart disease and strokes that women without diabetes had before the menopause.

A reason for the prevalence of diabetes escalating is that people are becoming more overweight and less active (UKPDS, 1995). Obesity is now confirmed as a major risk factor for the development of diabetes, especially those with body mass index (BMI) greater than 28 (UKPDS, 1995). It is suggested that a particular body shape, an apple shape, with central adiposity, is linked to insulin resistance, a disorder in which the body produces insulin, but is unable to use it properly, especially among the ethnic minority group (McKeigue et al., 1992; Stewart et al., 1994; Dhawan et al., 1994).

Non-insulin dependent diabetes mellitus (Type II diabetes) affects approximately 2 percent of the British population (O'Rahilly and Savill, 1997) and this seems to be hereditary (Viswanathan et al., 1996), and more common in Indo-Asians compared to European Caucasoids (Mohan et al., 1986; Zimmet et al., 1990). UKPDS IV (1988) showed that in 25 to 65 years olds newly diagnosed with Type II diabetes, almost half (41 percent) had a close relative with diabetes.

The life-time risk of diabetes in the general population is quoted as 10 - 15 percent (Pierce et al., 1995), with a parental history of diabetes increasing the risk by 2 - 4 times. The same study also found a positive association between diabetes, alcohol intake and smoking; smokers have a 50 percent higher risk of developing a disease than those who have never smoked. The risk of diabetes progressively decreased with increasing levels of physical activity and moderate alcohol drinking.

Diabetes, typically Type II, is three to six times more common among people of Indo-Asian origin living in the UK (Mather and Keen, 1985; Simmons, 1991; Primatesta and Brookes, 1999). Cruickshank (1991) and UKPDS XII, (1994) found that diabetes tended to developed at a younger age, approximately 5 years younger in this group.

TYPES OF DIABETES MELLITUS

According to a current WHO classification, there are six major clinical sub-classes of diabetes (Watkins et al., 1996) (Table 4a):

Table 4a. WHO classification of diabetes mellitus

CLINICAL CLASSES
Insulin-dependent diabetes mellitus (IDDM)
Non-insulin-dependent diabetes mellitus (NIDDM)
Non-obese
Obese
Malnutrition-related diabetes mellitus (MRDM)
Other types of diabetes associated with certain conditions and syndromes
Pancreatic disease
Disease of hormonal aetiology
Drug-induced or chemical-induced conditions
Abnormalities of insulin or its receptors
Certain genetic syndromes
Miscellaneous
Impaired glucose tolerance (IGT)
Non-obese
Obese
Associated with certain conditions and syndromes
Gestational diabetes mellitus (GDM)

With acknowledgement to Watkin et al., 1996, p6

Insulin-dependent diabetes mellitus (IDDM), otherwise known as Type 1 diabetes: There is a complete absence of insulin, resulting in a need for insulin injections in order to survive. It seems likely that IDDM is an autoimmune condition (Steven, 1998). That is, the immune system, which exists to protect the body against infection and disease, turns against itself destroying the insulin-producing cells in the pancreas. IDDM most commonly occurs in children under the age of 15 years and amongst Caucasian populations (Diabetes UK, 2001). Symptoms are often marked and diagnosis usually follows quickly. It appears to be rare amongst the children of migrants from the Indo-Asian countries (Odugbesan and Barnett, 1985; Mather and Keen, 1985; Cruickshank, 1989; Gujral et al., 1994), although the published evidence for this is limited

(Cruickshank, 1989). Recent observations have suggested that it is either on the increase amongst Asian children or has previously been under reported (Samanta, 1989; Feehally et al., 1993).

Non-insulin-dependent diabetes mellitus (NIDDM) otherwise known as Type 2 diabetes. This is caused either by a shortage of insulin or a fault in the way the body responds to insulin, known as insulin resistance. Insulin is produced but is unable to do its job of enabling the cells to absorb glucose from the blood. NIDDM accounts for 80 percent of people with diabetes and is broken down into two forms, non-obese and obese. It usually occurs in people over 40 (Diabetes UK, 2001), its prevalence increasing with age.

In some UK populations, notably Indo-Asians, NIDDM occurs at a much earlier age than in the White population, (McKeigue et al., 1988; Cruickshank, 1989; Hawthorn, 1990; Feehally et al., 1993; Simmons and Powell, 1993). Similar figures are now appearing from studies of migrants from rural to urban areas within less developed countries. Hodge et al. (1995) estimated that by year 2020 there will be 250 million people with NIDDM in the world.

Malnutrition-related diabetes mellitus (MRDM): This type of diabetes is now included as a separate category. It said to occur in tropical, developing countries amongst malnourished and grossly underweight young people. The diabetes is often insulin-resistant but without a tendency to ketosis. It is suggested that fibrocalculous (calcific) pancreatic diabetes and protein-deficient pancreatic diabetes may be two important subclasses of this (Watkins et al., 1996). However, the evidence for it is based on anecdotal clinical experience rather than on prospective studies (Cruickshank, 1989).

Impaired glucose tolerance (IGT): IGT may precede clinical diabetes mellitus. Such individuals have an increased risk of macrovascular disease but are not at risk of microvascular disease (Watkins, et al., 1996). The prevalence of IGT is also higher in ritish Indo-Asians than in Caucasians (Simmons et al., 1991; Simmons and Powell, 1993).

PREVALENCE OF NIDDM IN BRITISH INDO-ASIAN PEOPLE

Numerous studies have shown that there is a higher incidence of NIDDM occurring in people who have emigrated from the Indo-Asian countries than in the indigenous white population in Britain. The most extensive study in the UK, the 1985 Southall Diabetes Survey, showed that the prevalence was four times higher than in whites, when adjusted for age. The incidence increases with age so that in Indo-Asian people between 40 to 64, it is at least five times higher, between 50 -59 it is 8 percent higher and between 60 to 69 it is 12 percent higher (Mather and Keen, 1985). The report indicated that these might be under-estimates so that, in reality, there are many more Indo-Asians with diabetes who remain undiagnosed.

A study carried out in Coventry (Simmons et al., 1989) also showed that for Asian men, the prevalence was four times higher than for white men. This study found that prevalence of diabetes was not as high among Asian women as Asian men, although it was still twice as high as in white women. This was confirmed by a study in Leicester (Feehally et al., 1993), a city with a large Asian population with high incidence of NIDDM, where it has been found that the risk in females does not begin to increase until after the age of 50. Nevertheless, Feehally and colleagues (1993) indicated that Asian women are more at risk from gestational diabetes than white women and, even where they have the same treatment regimen; there are three times as many foetal complications. This indicates that diabetes needs to be more carefully managed during pregnancy if problems are to be reduced.

A study carried out in west London (McKeigue et al., 1991) examined men and women, aged between 40 and 69 years old, and found that the incidence of NIDDM amongst Indo-Asian subjects was extremely high, 19 percent compared with 4 percent amongst the European subjects.

In 1999, the Health Survey for England showed that the prevalence of diabetes was between three to six times higher in the Indo-Asian groups than in the general population (Primatesta and Brookes, 1999). The observed prevalence of diabetes was generally higher in men than in women. Pakistanis and Bangladeshis of both sexes showed rates over five times higher than the general population. Indian men and women were almost three times as likely as the general population to report diabetes.

On the other hand, a population-based cross-sectional survey carried out to investigate the potential environmental risk factors for diabetes during 1986 and 1991 in Indo-Asian people living in the United Kingdom and in Dar es Salaam, Tanzania (Africa) found that the prevalence of impaired glucose tolerance (28.4% vs. 11.4% ($p<0.01$)), newly diagnosed diabetes (8.6% vs. 1.5% ($p<0.01$)), hypercholesterolaemia (9.9% vs. 1.5% ($p<0.001$)), and smoking (12.1% vs. 3.9% ($p<0.01$) were significantly higher in subjects in Tanzania compared to subjects in the UK, (Ramiaya et al., 1995). The prevalence of known diabetes, hypertriglyceridaemia, newly diagnosed hypertension, known hypertension and obesity were similar in the two groups.

Although the subjects were genetically similar, there were a number of significant differences between the groups. Tanzanian-Indians had significant higher mean levels of fasting glucose (5.5 mmol/L^{-1} vs 5.1 mmol/L^{-1}; $p<0.001$), 2-hour glucose (6.8 mmol/L^{-1} vs 6.0 mmol/L^{-1}; $p<0.001$) and less physical active than British-Indians. However, mean levels of triglycerides (1.5 mmol/L^{-1} vs 1.3 mmol/L^{-1}; $p<0.05$) and systolic blood pressure (135 mmHg vs 127 mmHg; $p<0.05$) were significantly higher in subjects in the UK. Level of physical activity, only in the Tanzanian subjects, showed a significant inverse relationship with 2-hour plasma-glucose. The study demonstrated a link between geographic variations and disease prevalence and indicated that domicile in Tanzania was associated with higher levels of 2- hour glucose, cholesterol and diastolic blood pressure while domicile in the UK was associated with higher serum triglycerides and systolic blood pressure. As people with impaired glucose tolerance are more likely to go on to develop NIDDM (Simmons et al., 1991; Simmons and Powell, 1993; Ramiaya et al., 1995), this suggests that there are more likely to be a large 'pool' of patients with diabetes in this ethnic minority group.

HYPOTHESES FOR A HIGH INCIDENCE OF NIDDM IN BRITISH INDO-ASIANS

The cause of the high prevalence of NIDDM in Indo-Asians is not yet clear and there is much speculation. Evidence suggests links with both: (1) genetic and (2) environmental and life-style factors, particularly diet and reduced physical activity (Taylor and Zimmet, 1983; McKeigue et al., 1988; Pawa, 1989; McKeigue et al., 1991; Dhawan et al., 1994; UKPDS XII, 1994; Ramaiya et al., 1995).

(1.) Genetic factors

Two genetically determined factors appears to be important in NIDDM: (1) insulin deficiency (relating to insulin secretion) and (2) insulin resistance or some refer to 'insulin insensitivity' (relating to insulin action). It is not agreed whether insulin deficiency, insulin resistance or a combination of the two represents the primary pathogenic process. It is difficult to distinguish which process comes first because of the way the two processes interact with one another. For example, "at hyperglycaemic stage, the body produces more insulin in order to try to overcome the insulin resistance, which may ultimately exhaust the beta cells resulting in insulin deficiency" (Guthrie and Guthrie, 1997). McKeigue and colleagues (1991) suggested that insulin insensitivity underlies the differences in insulin levels in British Indo-Asians. Gelding and colleagues (1994) demonstrated that insulin insensitivity is a primary feature of NIDDM in this ethnic group. Insulin sensitivity of the first-degree relatives of British Indo-Asians with diabetes, the group at highest risk of developing diabetes, was assessed by means of the short insulin tolerance test. Insulin (0.05 units/kg body weight) was administered intravenously and blood samples were taken at minute intervals from 3 minutes for measurement of glucose, and at times 0, 4, 8 and 15 minutes for insulin (Gelding et al., 1994). Asians' relatives were less sensitive to exogenous and endogenous insulin and they were more hyperinsulinaemic, both fasting and in response to glucose, before diabetes develops, suggesting that insulin insensitivity may be an early abnormality in the development of NIDDM in the Asian population.

(1.1) <u>Familial aggregation to NIDDM</u>

Individual predisposition to NIDDM is governed by multiple factors but inherited factors seem predominant (Hitman et al., 1992). The importance of the genetic component is indicated by aggregation within families (Stern and Haffner, 1990; Thomas et al., 1994), by twin studies (Barnett et al., 1981; Newman et al., 1987), by genetic admixture studies (Serjeantson et al., 1983; Gardner et al., 1984) and by the demonstration of specific gene mutations in certain families (Bell et al., 1991; Froguel et al., 1992).

The prevalence of NIDDM is approximately three times higher in indigenous urban Indian populations than in European and North American Caucasians (Ramachadran et al., 1992; King and Rewers, 1994) and a family history of NIDDM is more common in diagnosed British Indo-Asians compared with Europeans with diabetes (Mohan et al., 1986; Ramachadran et al., 1992), and Tanzanian-Asians with diabetes (Ramaiya et al., 1995).

Viswanathan and colleagues (1996) carried out a study of the family history of 976 Indians with NIDDM. Patients were asked whether there was any parental history of diabetes in the family. Over forty percent of patients reported having one parent who was diabetic (53 percent fathers and 48 percent mothers had diabetes), and in the remaining patients, both parents were diabetics. This excess of fathers with diabetes is contrary to previous findings of substantial maternal excess in the transmission of diabetes (Thomas et al., 1994; Alcolado et al., 1991; Korugan et al., 1991). The age of diagnosis of diabetes in these patients was found to be lower than that of their diabetic parents ($p < 0.001$). An increase in family size was found, for the first time, to be associated with a stronger familial history of diabetes in this group.

(1.2) <u>Central obesity and insulin resistance syndrome</u>

Above average body mass indices were considered as a risk factor of the development of diabetes in other populations, such as middle aged British men (Perry et al., 1995), West Africans (Cruickshank et al., 2001), Pima Americans (Knowler, et al., 1981), and Nauruans (Pacific ocean) (Zimmet, et al., 1977). However, this trend does not seem to appear among Indo-Asians with diabetes.

There is a great deal of evidence pointing to the presence of central obesity (operationally defined by waist-hip ratio), in many Indo-Asians with diabetes. Central obesity is associated with an insulin-resistance syndrome, which characterised by glucose intolerance (impaired glucose tolerance and diabetes), hyperinsulinaemia (high insulin level), hypercholesterolaemia (high level of cholesterol), hypertriglyceridaemia (high triglycerides), low plasma HDL-cholesterol (the type of lipoprotein that transports cholesterol back to the liver from peripheral cells) and hypertension (high blood pressure) (Freedman, 1983; Zimmet et al., 1983; McKeigue et al., 1988; Simmons et al., 1989; D'Costa et al., 1991; McKeigue et al., 1991; McKeigue et al. 1992; Dhawan et al., 1994).

British Indo-Asians with diabetes were more hyperinsulinaemic, both at fasting and after a glucose load, compared with Caucasians with diabetes (McKeigue et al., 1991; McKeigue et al., 1992; Simons and Powell, 1993; UKPDS, 1994; Dhawan et al., 1994), and with Indian Asians with diabetes (Dhawan et al., 1994), suggesting a higher prevalence of insulin resistance in this ethnic group. Findings of blood pressure, cholesterol and triglyceride levels of British Indo-Asians with diabetes vary between studies. McKeigue, et al., (1991) found that British Indo-Asians with diabetes had higher systolic and diastolic blood pressure and fasting triglyceride levels than in Caucasians, but had lower total cholesterol and plasma HDL-cholesterol than Caucasians, while the other two studies found it differently. The UK Asians with diabetes had lower systolic and diastolic blood pressure than in Indian-Asians (Dhawan,

et al., 1994), and than in Caucasians (Dhawan, et al., 1994; UKPDS, 1994).
UK-Asians had higher cholesterol concentrations compared to Indian-Asians (Dhawan,et al., 1994), and Caucasians (Simmons and Powell, 1993). Triglyceride levels were found to be similar between UK-Asians and Caucasians (UKPDS, 1994), but UK-Asians had higher plasma HDL-cholesterol than in Indian-Asians and Caucasians (Dhawan, et al., 1994). This difference may stem from participants' characteristics. Participants recruited in studies by Dhawan and colleagues' and UKPDS' abstained more from smoking and alcohol and were more sedentary in physical life-style than McKeigue and colleagues' participants, who were recruited from an industrial force. Despite the differences and their lower body mass index, British Indo-Asians and Indian-Asians had higher waist-hip ratios (more central obesity) and were more insulin resistance than Caucasians (McKeigue, et al., 1991; McKeigue, et al., 1992; Dhawan et al., 1994; UKPDS, 1994).

McKeigue, et al., 1992 found, especially in British Indo-Asian women, that there is a strong association between glucose intolerance and waist-hip ratio. Thigh skin-fold thickness, especially of British Indo-Asian females, is inversely associated with glucose intolerance. Although British Indo-Asian men had higher work activity scores, they are less active in leisure time and their waist-hip ratio was associated with 2-hour insulin concentrations, and was inversely correlated with leisure time score, but not with work activity score. McKeigue and colleagues (1991) found that correlations with insulin and triglyceride levels were stronger for waist-hip ratio than for BMI, especially in British Indo-Asian females. Waist-hip ratio is also correlated with fasting triglyceride levels and triglyceride response to a glucose load, so that higher waist-hip ratios were associated with failure of triglycerides to fall after a glucose load.

The mechanism of association between central obesity and insulin resistance is unclear. In comparison with the general population, British Indo-Asians tended to accumulate fat in the abdomen and truncal region and consequently have larger waist circumferences, larger abdominal diameters, and thicker truck skin-folds (McKeigue, et al., 1991; 1992, Dhawan et al., 1994). The distribution of this particular type of body fat, especially in British Indo-Asian men (whose waist-hip ratio were the highest) may influence plasma triglyceride levels (higher waist-hip ratio, higher fasting triglyceride levels but slower fall of triglyceride levels after 2-hour of glucose load) (McKeigue, et al., 1991; 1992). Kissebah and colleagues (1982) believed that release of non-esterified fatty acids from intra-abdominal fat cells into the portal circulation might affect hepatic insulin metabolism and peripheral glucose uptake. This suggested that central obesity is associated with failure of insulin to suppress release of non-esterified fatty acids from intra-abdominal fat cells. This failure would lead to increased hepatic synthesis of very-low-density-lipoprotein (the type of lipoprotein made primarily by liver cells to transport lipids to various tissues in the body, and composed primarily of triglycerides).

A case control study of Dhawan and colleagues (1994) demonstrated that central obesity in subgroups of British Indo-Asians had a close association with hyperinsulinaemia (excessive secretion of the hormone insulin by the islet cells of the pancreas) and the risk of coronary artery disease. They studied 200 males with coronary heart disease and found that ethnic Indian men in both the UK and India had higher total plasma insulin concentrations in the fasting state and after a glucose load than white British men. In these patients, hyperinsulinaemia was strongly associated with central obesity and these factors were associated both with one another and with the presence of coronary heart disease. In addition, both British and Indian Asians had lower HDL (high- density lipoprotein) levels, higher LDL (low-density lipoprotein) levels and higher triglyceride levels than white British men, although total cholesterol levels were similar. Central obesity was inversely related to HDL level and directly related to hypertriglyceridaemia. The authors concluded that a predisposition to insulin resistance and its metabolic abnormalities in these Asian groups seemed to be genetically determined, environmental changes after migration having only a small additional effect.

(2.) Environmental factors

(2.1) Obesity and sedentary life-style

Criuckshank (1989, 2001) argues that however important the genetic story, it must be fitted into the wider context. Environmental factors, such as change in life-style habits, particularly diet, and reduced physical activity have been suggested as important factors in the high incidence of NIDDM in British Indo-Asians (UKPDS XII, 1994; Riste et al., 2001). A cross-sectional population study of 9,903 people (5,508 Europeans, 4,395 British Indo-Asians) in Foleshill, Coventry found that by the age of 29, British Indo-Asians had higher 2 hour glucose and insulin concentrations and, in males, a higher cholesterol concentration than Europeans (Simmons and Powell, 1993). British Indo-Asians with known diabetes had an earlier age at diagnosis, but had lower BMI both in the past and currently. Unfortunately, the study did not measure the differences in the degree of central obesity between the two ethnic groups. The authors pointed out that the extent of obesity (body mass index or BMI) amongst the young British Indo-Asians in this study was 2 - 3 kg/m^2 more than young South Asians in urban India (Sood et al., 1984 cited by Simmons and Powell, 1993). Body mass indexes of middle-aged British Indo-Asians were found to be similar to those in the Southall study (McKeigue et al., 1991), but were higher than those in urban India (males: Coventry 25.7 kg/m^2, Sounthall 25.7 kg/m^2, Urban India 22.8 kg/m^2; females: Coventry

26.7 kg/m^2, Southall 27.0 kg/m^2, Urban India 25.8 kg/m^2).

A high prevalence of total obesity (as measured by BMI) and central obesity (as measured by waist –hip ratio) amongst British Indo-Asians with NIDDM were found in a prospective study of UKPDS XII (1994). The age at diagnosis of British Indo-Asians was found to be 5 years younger, they were shorter, had lower BMI, insulin insensitivity and more hypertension compared with Caucasians. However, British Indo-Asians seemed to have higher waist-hip ratio, a more sedentary life-style, a family history of diabetes and more children than Caucasians.

Triglyceride and HDL cholesterol levels were found to be similar amongst the two ethnic groups. It was thought that both genetic (family history of diabetes) and environmental (more sedentary life-style and less physical activity levels) factors could contribute to the high prevalence of NIDDM in British Indo-Asians. It was also thought that high insulin resistance found in British Indo-Asians might be related to their sedentary life-style and higher central obesity.

<u>(2.2) The small baby syndrome</u>

A link has been described between low birth weight and adult risk of both diabetes and cardiovascular disease (Hales et al., 1991; Hales and Barker, 1992). It could be proposed that the susceptibility of Asian subjects to diabetes, renal failure, and cardiovascular disease are all the consequences of the common antecedent of intrauterine growth retardation. This argument suggests that babies born to mothers who have been protein malnourished during pregnancy develop particular phenotypic characteristics, including central distribution of adipose tissue, insulin resistance, and diminished pancreatic and renal reserve, perhaps the consequence on poor capillarization of these organs and of skeletal muscle. If these babies remain thin and poorly nourished throughout life, their risk of adult diabetes or cardiovascular disease remains low. However, should that individual be exposed, for example by migration, to high energy, salt, protein and lipid intake, the consequence would be central obesity, hypertension, diabetes, renal failure and cardiovascular disease.

(2.3) Psychological Stress and Socio-economic Deprivation

It has long been assumed by the public that psychological stress, particularly at the workplace, is a major risk factor for heart disease, and firm evidence of this association has now been found (Bradley and Gamsu, 1993). The psychological well being of patients is the main factor in the successful management of diabetes. It is also thought that the role of psychosocial stress has an impact on both the onset and course of NIDDM (Greenhalgh, 1997).

A survey carried out in Glasgow demonstrated a number of circumstances associated with stress - length of working day, low income, crowded housing, liability to attack and perceived lack of social support (typically in women). These sources of stress seemed greater in British Punjabis than in whites (Williams et al., 1994). Williams and colleagues concluded that, in addition to insulin resistance and dietary imbalance, stress and economic deprivation should be considered as potential risk factors for diabetes in this ethnic group.

It has been found that British Indo-Asians with diabetes have difficulties in access to, and use of, health services for diabetes (Hawthorne, 1994). Ethnic Asian patients in Leicester with symptoms of coronary heart disease were significantly less likely to have been referred for exercise stress testing than white British patients (Lear et al., 1994a).

Lear and colleagues (1994b) also found that few Asian patients with myocardial infarction had been given thrombolysis (the dissolution of a blood clot by the infusion of an enzyme into the blood) compared to white British. A referral for investigation for anginal symptoms for patients of Indian origin would take longer (an average of 17.4 months after the onset of anginal symptoms) than those in White British (an average of 6.9 months after the onset of anginal symptoms) (Shaukat et al., 1993).

It is likely that language barriers, poor knowledge of services, socio-economic deprivation, difficulties with transport, and differences in willingness to seek medical help all reduced the accessibility of services. However, this reduced accessibility will undoubtedly cause psychological-stress and so negatively influence the way this ethnic minority group cares for their diabetes.

It has been suggested that the increase in prevalence of diabetes generally may have something to do with increasing affluence and prosperity (Samanta, 1989; Freehally et al., 1993; McKeigue et al., 1989). However, studies in both Great Britain and the United States have shown that overall rates of NIDDM are considerably higher in towns with worse social and economic conditions (Jarrett, 1986; Shillitoe, 1988; Riste et al., 2001).

Riste and colleagues (2001) found a high prevalence of NIDDM in all ethnic groups, including Europeans in a British Inner city: Manchester. Poverty indexes were prominent; more than 60 percent of individuals reported household annual incomes of less than £10,000. The prevalence of diabetes (known and newly diagnosed) was higher in British Indo-Asian (predominantly, Pakistanis) than in Europeans (17 and 24 percent Europeans, 25 and 41 percent Pakistanis), and the prevalence of diabetes seemed to increase rapidly with age. Both genders of British Indo-Asian were found to be younger and shorter, but were more obese and had higher waist-hip ratio than Europeans. They found that, although BMI was a predictor of fasting and 2-hour glucose concentrations, waist-hip ratio and physical activity levels mediated glucose concentration and blood pressure. They finally concluded that in addition to obesity and physical inactivity, poverty was likely a contributor to the high prevalence of diabetes across all the ethnic groups.

(2.4) Smoking, chewing tobacco and betel-nut

Smoking is an independent risk factor for both coronary heart disease and NIDDM (Rimm, et al., 1995). Cigarette smoking has been shown in a prospective study to increase the risk of becoming diabetic among current and former smokers, supporting experimental evidence that smoking exerts both a short-term effect on insulin sensitivity and a long-term effect on insulin secretion. Although smoking is, overall, no more common in British Indo-Asian than in the indigenous UK population (McKeigue et al.,1989). A prospective survey (UKPDS XII, 1994) showed that Asian males were significantly more likely to smoke than Caucasians, but females less likely (males: Caucasians 35 percent, British Indo-Asians 37 percent; females: Caucasians 29 percent, British Indo-Asians 6 percent, after adjustment for age). However, cigarette smoking in British Indo-Asian males was not statistically related to the high prevalence of NIDDM within this group.

A population-based cross-sectional survey carried out to study potential environmental risk factors contributing to diabetes and cardiovascular risk in comparable homogeneous groups in the United Kingdom and in Dar es Salaam, Tanzania found that cigarette smoking is more common among Asian males in Tanzania than in Asian males in the UK (Ramaiya et al., 1995). This survey did not set out to investigate an association between cigarette smoking and the high incidence of

NIDDM within this ethnic group. However, it was found that a higher prevalence of cigarette smoking was very common among subjects with higher levels of education both in the UK and in Tanzania, but cigarette smoking is less common in British Indo-Asian females, especially amongst Bangladeshis (Boreham, 1999) and non-Muslim groups (McKeigues et al., 1992; HEA, 1995), particularly Sikhs, whose religion counsels against the habit. However, cigarette smoking in male Tanzanian-Asians did not relate to the mean levels of blood glucose, serum cholesterol, serum triglyceride, and systolic and diastolic blood pressure (Ramaiya et al., 1995).

This recommends a need for further research to measure an association between cigarette smoking and the incidence of diabetes, especially among the British Indo-Asians.

Consumption of betel-nut or paan masala (*Areca catechu*) is common amongst north Indians and Bangladeshis. Prevalence was highest among Bangladeshi men and women living in the UK when compared with Pakistanis and Indians living the UK (rates per 1000; men: Bangladeshis 19, Pakistanis 2, Indians 6; women: Bangladeshis 26, Pakistanis 2, Indians 2) (Boreham, 1999). Boreham found that the use of chewing tobacco among Bangladeshi men and women increases with age. Fourteen percent of British Bangladeshi men aged 16 - 34 used chewing tobacco, compared with 23 percent of men aged 35 - 54 and 28 percent of British Bangladeshi men. Equivalent prevalence figures for British Bangladeshi women were 15 percent among women aged 16 - 34, 43 percent among women aged 35 -54 and 56 percent among women aged 55 and over.

Betel-nut contains nitrosamines with some chemical similarities to stretozotocin (a nitrosamide used to produced experimental diabetes in animals) (Boucher et al., 1994). Boucher and colleagues have shown its contribution to the onset of impaired glucose tolerance and diabetes in animals but its role in the aetiology of diabetes in humans is in dispute.

RISK OF COMPLICATIONS

If people with diabetes (either IDDM or NIDDM) fail to maintain good metabolic control they are likely to develop any one of a number of distressing, even life-threatening, complications. Damage to the tiny blood vessels in the back of the eyes (retinopathy) can result in blindness; peripheral nerve damage (neuropathy) may lead to amputation if unfelt injuries are neglected; there may be impotence due to narrowing blood vessels and nerve damage, and there is a risk of developing kidney disease (nephropathy).

There is a clear relationship between the duration of diabetes and the development of complications, which places British Indo-Asians at greater risk because they tend to develop NIDDM at a much earlier age than whites.

Cardiovascular disease

The term cardiovascular disease (CVD) covers coronary heart disease (CHD), strokes and all other diseases of the heart and circulation, including congenital defects and rheumatic heart diseases (Diabetes UK, Sept. 2001).

The population of the UK has one of the highest death rates from Cardiovascular disease (CVD). Evidence has emerged that males and females with diabetes, originating from the Indian subcontinent, had approximately twice as high death rates from CVD and three times as high death rates from ischaemic heart disease compared to general population of England and Wales (Chaturvedi and Fuller, 1996). Chaturvedi and Fuller demonstrated that ethnic differences in mortality rates were greater in the younger age group than in the older age group. In British Indo-Asians, ischaemic heart disease mortality is four times higher than for the white England and Wales population in the younger age group (45 - 64 years), and only three times higher in the other group (65+ years). Their study also demonstrated that mortality rates from heart disease increased by up to three times when people with NIDDM were compared.

The prevalence of classic risk factors such as smoking, hypercholesterolaemia and hypertension are generally lower in Indian Asians, especially in females, than in the Europeans (McKeigue et al., 1993), implying that these risk factors do not account for the excess coronary heart disease (CHD) mortality in Indian Asians (McKeigue et al., 1991). McKeigue and colleagues believed that genetic insulin resistance syndrome (glucose intolerance, raised plasma insulin, increased triglycerides, decreased HDL-cholesterol and central obesity) was the most plausible explanation for the high incidence of CHD mortality in British Indo-Asians. This hypothesis is supported by numerous studies. (1) A study of Dhawan and colleagues (1994) found waist-hip ratio to be the strongest predictor of CHD in British Asians, and waist-hip ratio and low HDL-cholesterol concentrations were found to be independent predictors of CHD in Indian Asians. (2) A study carried out in Bangladesh by Sayeed and colleagues (1998) found that not only high waist-hip ratio but also increasing age and high blood pressure were independent risk features for CHD among non-smoking Bangladeshis aged 30 – 60 years old. (3) Knight et al (1993) found that a high prevalence of low-HDL cholesterol concentrations, higher triglycerides, diabetes and a lower frequency of exercise in leisure time among British Indo-Asians, were associated with a higher risk of heart disease when compared with whites.

However, a study of Ramaiya and colleagues (1995) comparing diabetes, IGT and cardiovascular disease risk factors between British- Asians and Indian-Asians, suggests the contrary. They found that within the same homogeneous community with the same likely genetic predispositions, there were substantial geographical differences in cardiovascular risk factors, which they thought were likely to be related to environment, the causes of which, the authors suggested, needed further research.

Historically, CHD has tended to appear first in the more affluent socio-economic groups, and has then spread into the rest of the population, eventually becoming commonest in those of lowest socio-economic status (Marmot et al., 1978; Marmot, 1982). This may be attributed to a wide range of inexpensive fast foods services and a sedentary life-style. The level of educational background has now been confirmed to be associated with coronary heart disease and coronary risk factors. Gupta and colleagues (1994) found that the prevalence of coronary heart disease (diagnosed by electrocardiography) was significantly higher among uneducated and less educated people. An overall decrease in the prevalence of coronary heart disease with increasing educational status was apparent in both sexes, but the trend was significant only in women ($\chi^2 = 7.25$; $p = 0.007$). Coronary risk factors: smoking (men: $\chi^2 = 56.61$, $p < 0.001$; women: $\chi^2 = 4.76$, $p = 0.029$) and hypertension (men: $\chi^2 = 6.41$, $p = 0.011$; women: $\chi^2 = 27.70$, $p < 0.001$) were also found to be more prevalent among the uneducated and less educated people.

A study by McKeigue and colleagues (1991) did not seem to indicate that smoking was an independent predictor of CHD among Indo-Asians living in the UK. However, Pais et al. (1996) demonstrated that in India, first acute myocardial infarction (AMI) was strongly associated with current smoking (odds ratio 3.6), followed by a history of hypertension (odds ratio 2.69). Overt diabetes mellitus (odds ratio 2.64), abdominal obesity (adjusted odds ratio 2.24), and fasting blood glucose concentration (adjusted odds ratio 1.62) were also important risk factors, but vegetarianism had a significant protective effect (odds ratio 0.55). The authors suggested that smoking cessation programmes (for cigarette and the local form of tobacco (beedis)), treatment of hypertension, and re-education in blood glucose and central obesity (perhaps by diet) could be key factors in the prevention of premature ischaemic heart disease in Indo-Asians.

Bhopal and colleagues (1999) carried out a cross-sectional study comparing CHD risk factors in Indians, Pakistanis, Bangladeshis and Europeans. They found that Bangladeshi men were the youngest and were the most recent immigrants. Indians were the most educated, and Bangladeshis were the least educated. Indians had a similar median income to Europeans, but higher than Pakistanis and Bangladeshis. Cigarette smoking was most prevalent among Bangladeshis. Pakistanis and Indians were more likely than Bangladeshis and Europeans to eat fruits or vegetables daily. Only a few Pakistanis and Bangladeshis drank alcohol; most Indians did. However, the Indians were most, and Bangladeshis were least physically active. Obesity was commoner in Pakistanis and Indians than in Bangladeshis. Differences in central obesity between Indo-Asians were small. Waist-hip ratios ≥ 0.95 were commoner in Pakistanis and Bangladeshis and about four times higher in Indo-Asians than in Europeans. Differences in hypertension between Indians, Pakistanis and Bangladeshis were not significant, but hypertension was least common in Bangladeshis and less common in Indo-Asians than in Europeans. Among Indo-Asians, Bangladeshis had less coronary heart disease than Indians and Pakistanis when compared on questionnaire data and on electrocardiography. Indo-Asians had more possible myocardial infarction (questionnaire data) and probable coronary heart disease (on the electrocardiography) than Europeans.

This study showed that Indians, Pakistanis and Bangladeshis differed in a wide range of coronary risk factors, which suggests that the belief that of Indo-Asians as a group have lower levels of coronary risk factors than Europeans was incorrect. This suggests that findings based on data pooled across sub-groups of Indo-Asians should be treated with caution, and that it would be better not to treat them as a single homogenous group.

Renal disease

End-stage renal disease (ESRD) is another complication associated with diabetes and hypertension which is much more common in British Indo-Asians than in whites in the UK (Burden et al., 1992; Lightstone et al., 1992), whether assessed by microalbuminuria (Allawi et al., 1988) or albustix-positive proteinuria (Samanta et al., 1986). Indo-Asians have a high prevalence of NIDDM, and among those who develop ESRD it is predominantly Type 2 diabetes (NIDDM) that is implicated (Raleigh et al., 1997). Their greater need for renal replacement treatment is accompanied by difficulties of tissue matching in cross-racial transplants and a shortage of donor organs (Higgins et al., 1997).

Burden and colleagues (1992) found that British Indo-Asians with ESRD were predominantly men [M:F ratio = 9:1 for Asians, 7:3 for Caucasians] with higher median age at onset of renal replacement therapy [Asians = 57 years; Caucasians = 52 years], and all were classed as Type 2 diabetes (NIDDM) [IDDM:NIDDM = 0:10 for Asians, 4:6 for Caucasians]. The incidence of ESRD secondary to diabetes was significantly higher in persons of Asian ethnic origin, whether expressed either as the incidence rate in the general population or in the estimated population with diabetes. The incidence of diabetic nephropathy in the general population, cases per million person-years, was 23.3

(95% CI, 8.9 to 37.7) for Asians and 2.3 (95% CI, 1.1 to 3.6) for Caucasians. The incidence in the diabetic population was 486.6 (95% CI, 185.1 to 288.1) for Asians and 35.6 (95% CI, 17.0 to 54.2) for Caucasians.

The relative risk of end-stage renal failure secondary to diabetes in those of Asian ethnic origin was 13.6 (95% CI, 6.04 to 30.6). The incidence end-stage renal failure from all other cases (excluding diabetes) was also significantly higher in Asians than in whites [Asians = 172 (133.3 to 211.9); Caucasians = 47.1 (29.7 to 64.5) cases per million persons-years], giving a relative risk of 3.66 (95% CI, 2.66 to 4.44). The authors suggested that the high prevalence of diabetic renal disease and end-stage renal failure in Asians, especially males, may conceivably be due to an intrinsic susceptibility to renal injury as suggested by the higher incidence of end-stage renal failure from all cases, which excluded diabetes. The low rate of end-stage renal failure in females may relate to dietary differences from their male counterparts, as most females were vegetarians. This could be that most vegetarian diets provide less protein, a factor that has been proven to mediate the progress of renal injury (Williams et al., 1985 cited by Burden et al., 1992).

A retrospective study involving 2 sites Hammersmith (London) and Leicester, carried out by Lightstone and colleagues (1995) also showed that end-stage renal failure had a 3 to 5 fold increase in Indo-Asians when compared with whites [Age-adjusted annual incidence per million at risk: indo-Asians = 115 (Hammersmith) and 123 (Leicester); Caucasians = 21.5 (Hammersmith) and 43 (Leicester)]. Although the percentage of Indo-Asian and white patients in each unit with diabetic nephropathy was similar (15.9 percent and 17 percent of Indo-Asians on renal replacement therapy compared with 11.4% and 8% of whites at the Hammersmith and Leicester unit, respectively), the age-adjusted incidence was 7 times higher among Indo-Asians than whites ($p < 0.001$). The authors found that increased diabetic renal disease only partly explained the high incidence of ESRD, as there was also a significant increase in the incidence of glomerulonephritis (a kidney disease involving glomerulus, usually thought to be the result of anti-body-antigen reactions that localize in the kidneys because of their filtering function) and chronic pyelonephritis, (a bacterial infection in which the kidneys become small and scarred and kidney failure ensues) among Indo-Asians as well.

These findings indicate immediate implications for primary health care screening and for planning the provision of renal replacement therapy among this ethnic group. Thus, it is important for those involved in the primary care of Indo-Asian patients to be aware of the high incidence of chronic renal failure.

FACTORS MEDIATING DIABETES CARE AMONG BRITISH INDO-ASIANS

Intensive management of blood glucose levels can reduce the risk of diabetes complications (UKPDS, 1998). This information needs to be shared with a patient so that the best possible outcomes can be achieved. Active involvement of the person with diabetes and family, in their management and care, is the most effective way to develop improved health outcomes (Litzelman et al, 1993).

The term 'adherence', in the modern medical view, is a mutual sharing of information, with goals of treatment and care that have been agreed between the health care professional and the patient (Gadsby, 1999). In fact, many physicians now regard the word 'compliance' as being outdated in modern diabetes care, as it implies judgement (Gadsby, 1999) and, most frequently, failure - so the term adherence is the preferred term. Edelmann (2000) also described compliance as a one-way communication from the health care provider to patient, and hence it refers to the extent to which the patient obediently and faithfully follows health care advice.

The two types of factors affecting adherence within an individual are: *internal* factors, which associated with an individual's characteristics, perception, attitudes, impression of the illness, feelings of the rationality of treatment, emotions caused by an illness and the way in which a person experiences life; and *external* factors connected with the social environment, supports from family, friends and health care professionals and the ways which treatments are arranged (Kyngas et al.,1995; Kyngas et al., 1997; Kyngas et al.,1998; Kyngas,1999; Hentinen et al., 1996).

However, when caring for diabetic patients from a different cultural background and religious beliefs, a particularly broad range of factors may influence adherence.

CULTURE

Culture is one of many factors that can affect individual attitudes and beliefs to health and related behaviour, typically in those whose educational attainment is limited (McAvoy and Donaldson (1990). First-generation British Asians most affected by the influences of Asian culture, while second and third Asian generations' attitudes and health beliefs are more westernised.

Health Beliefs

A good understanding of diabetes, its complications and other related factors, is vital to maintaining good glycaemic control and reducing the risks of complications (British Diabetic Association, 1987; McCulloch et al. 1983; Kronsbein et al. 1988). Appropriate and suitable health information needs to be made available to Asian diabetic patients. Information of attitudes towards health, lifestyles, expectations, family and social networks, beliefs and language is not enough to improve health-care delivery. However, understanding of these factors can help health providers to create awareness of the range of factors, which may be barriers to the improvement of health-care delivery, and to tailor the programmes that are suitable, acceptable and equitable to people uncertain of western education methods.

Asians came to England and brought with them their own ancient health beliefs, medicines and health practitioners (hakims). The two main classes are Ayurvedic and Unani medicines (Qureshi, 1990). Ayurvedic medicine started over 200 years ago and is based on plants and herbs. Unami medicine originates from the ancient Greeks and was brought to India from Central Asia by the Moghuls. Ayurvedic medicine is made from spices, herbs, and the bark of certain trees, with some use of heavy metals including lead, arsenic and mercury. Hakims base their practice on Unani medicine. Both traditional and western forms of medicine are recognised and supported by the Government of India for their National Health Programme.

Health beliefs held by Asians fall into three main categories:

1. The Hot/Cold foods concept. This concept is part of a belief that disease is caused by dietary imbalance, and this belief is part of both systems of traditional medicine mentioned earlier. The belief is that all foods fall into either hot or cold categories, as do

all illnesses. 'Hot' foods are to be avoided in 'hot conditions' such as pregnancy. For example it is thought that dried fruit, eggs and lentils can cause miscarriage. 'Cold' foods such as cauliflower, potatoes, rice and some pulses can lead to a 'cold condition' called 'bhye bhaddi' which causes excess mucus production, salivation and crusting of the eyes (Bhopal, 1986). It is not uncommon to find an Asian avoiding eating cauliflower and banana, a situation where Western dietary advice conflicts with their own health beliefs.

2. Herbal remedies (green pharmacy). Almost all Asians take karela (*Momordica charantia*) in some form on a daily basis. It has been observed that the hypoglycaemic property in the karela plant interacts with the western blood-glucose lowering tablet chlorpropamide (Aslam, 1979). Powdered mixtures are freely available at Asian shops for most ailments from acne to impotence. They usually contain varieties of mixed herbs; as they are not classed as medicine, they need no product licence and there is no way to monitor their quality or efficacy.

3. Asian practitioners: hakims (mostly consulted by the Muslims) and vaid (consulted by Hindus and Sikhs), heavy metal remedies and the evil's eye'. Hakims are Asian Muslim traditional practitioners. They have their own formal medical training and qualifications (five-years courses). Indian and Sri Lankan government sponsors Ayurvedic medical schools, and it was also recognised by the World Health Organisation in 1981 (Qureshi, 1990). Patients need to pay for attendance and medicines, which consist of mixtures of spices, herbs, and heavy metals. There have been some reports of steroids being added to medicines brought back from Pakistan, and there has been some concern about the possible toxic effects of heavy metals (Aslam, 1979).

These traditional remedies may be taken concurrently with Western medicines or instead of them. Their effect on diabetic control is largely unmeasured. Bhopal's survey, in Scotland, (1986) on the use of traditional remedies showed that knowledge and use of herbal remedies is high. However, Hawthorne (1994) found that the use of metal-based medication is rare, and hakims were rarely consulted in Britain. Bhopal suggested that the traditional remedies played a modest role within the context of total health care, and there was no evidence that it comprised a significant health threat (Bhopal, 1986). It was also suggested that Asians' health beliefs are not a hindrance to health promotion, once linguistic and cultural barriers have been overcome (Bhopal, 1986).

Attitudes to health professionals

Doctors are traditionally held in high esteem within Asian culture. Hawthorne and colleagues (1993) found that Indo-Asian women were not willing to be examined by a male doctor unless their life is absolutely at risk. The doctor is viewed as a busy, authoritative, and knowledgeable person who rarely makes mistakes and has full understanding of the conditions he or she treats. Therefore doctors' instructions must always be obeyed. Many doctors whose patients are Asians may notice that questions are rarely asked. Some Asian patients may have unrealistic expectations of the attention they should receive from the health services, for example, more time for each consultation (Hawthorne, 1994), examination by an opposite sex doctor (Greenhalgh, 1997), a separate waiting room for female and male patients (Hawthorne, 1994), and sympathy (Hawthorne, 1990). Ignorance of these factors can lead to non-attendance to a clinic appointment.

RELIGIOUS BELIEFS

Various religious beliefs can affect diabetic persons in different ways, especially the older ones. All Muslims are expected, once in their lifetime, to make a pilgrimage to Mecca, regardless of their diabetic control (personal interviews). Those who follow Islam will also be affected by Ramadan, which involves fasting during the daylight hours. Young children, people who are ill or pregnant women are exempt from fasting, although, it is often expected that the latter will make up the missed days at a later date (Young, 1997). It is felt that Muslims with diabetes need to get help on this point from an Islamic scholar and, should they decide to fast, their doctors should carefully monitor their conditions. Research into attitudes, religious beliefs and practices of patients during Ramadan is therefore, needed. Hospital appointments may also be affected if held on Fridays as male Muslims will visit the mosque, and females will remain at home to pray (Hawthorne et al., 1993).

Dietary practices

Dietary practice varies from one community to another, depending on religious beliefs and place of origin. The types of food, ingredients and methods of cooking are often subject to cultural influences. Similarly, the ways which people go about using food is influenced by religious beliefs. For example, the use of ghee or oil in cooking is considered a sign of prosperity (Hawthorne et al., 1993) and many varieties of diet rich in sugar, and sweet and savoury snacks that are deep-fried will be consumed during traditional weddings, parties and after fasting during Ramadan (Wilson et al. 1993).

Cultural aspects of diet may affect many aspects of care of an individual diabetic's condition. Asians enjoy using evaporated milk and sugar in sweetmeat, while brown sugar is believed to be healthier than white sugar and so is 'gur' or jaggery (Hawthorne et al., 1993). Honey was also considered to be good, and some Muslims have mentioned that honey is a recommended food from the Holy Koran (in personal interviews). Asian diabetic patients may well be taking a lot more sugar than expected by a doctor or nurse. Samanta and colleagues (1987) in Leicester found that patients were taking sucrose in forms other than white tablet sugar.

An Asian fruit 'karela' is used universally in cooking, and sometimes is used as an alternative treatment of diabetes. Karela has hypoglycaemic properties (Leatherdale, 1981), and its effect is thought to interact with conventional drugs (Aslam, 1979). Hypoglycaemic risk as a side effect of medication can be reduced significantly when there is efficient communication between health professionals and Asian diabetic patients. Despite dietary beliefs above Asian diabetic patients are, however, concerned about their diet and how it can affect their diabetic control. Webb (1982) found that 11 percent of all telephone enquires were about diabetes about diet. However, dietary advice and written information are not always available in Asian languages (Hawthorne et al. 1993). A national survey of diabetic clinics with more than 50 Asians on the register found that 40 percent had no record sheets and 34 percent had no hospital interpreter (Goodwin et al.1987). Many older Indo-Asians consider large body size to be a sign of prosperity and good health (Levy et al. 1986; Burden et al. 1992; Greenhalgh, 1997). Despite the fact that obesity is also a risk factor for diabetes mellitus, especially among females (Ramachandran et al., 1988; Ramachandran et al., 1992).

LANGUAGE DIFFICULTIES AND EDUCATIONAL BACKGROUND

The language barrier is cited as one of the most common reason for poor health care in people from ethnic minorities (Hawthorne, 1993; Hawthorne, 1994; Hawthorne, 1997; Wilson et al., 1993; Young, 1997). Ethnic patients may be perceived as 'awkward' if they do not comply with professional advice because they do not understand what is being said, or if they cannot eat offered food or take advised medication for religious or cultural reasons. Numerous studies show that a large percentage of the first-generation Asians cannot speak or understand English (Levy et al., 1986; Mello, 1992), and a survey carried out in 1990 found that only 25 percent of men and 4 percent of women of Pakistani descent could read English (Irving, 1994). Poor communication can lead to non-adherence and a lack of awareness of available services (Clake et al., 1988), and diabetic complications and their outcomes are the consequences (Burden, et al., 1992). The poor rate of response to appointment letter written in the English language, sent to Asian patients, may be attributed to illiteracy and reluctance. However, the use of an Asian link-worker has been shown to increase the response to health promotions (Wilson et al., 1993) and diabetic control (Hawthorne, 1997). Language barriers to healthy dietary intake for Asian diabetic patients can also be eliminated through a health education programme by using inexpensive and simple flashcards (Hawthorne, 1997) and an Asian link-worker (Wilson et al., 1993; Gillam and Levenson, 1999).

The lack of diabetes knowledge among the Asian diabetic patients is a cause for concern. The level of education attained in their original country combined with language difficulties, are contributory factors (Hawthorne, 1997). A study of 201 Asian diabetic patients in Manchester discovered that 84 percent of diabetic patients attending the study could not name any diabetic complications, 44.5 percent were unsure of the reasons for monitoring and controlling glucose concentrations, 87.5 percent did not know the purpose of attendance at the clinic to screen for early complications, and 96.5 percent did not know what a chiropodist did or how to see one (Hawthorne, 1997). The difficulties in providing adequate diabetes education to ethnic minority groups were highlighted in the Nottingham study, where 90 percent of the British and Asian diabetic patients remembered receiving education but the Asian group had poorer understanding of the disease and complications (Hawthorne, 1990). Bhopal (1986) once stated that health promotions could be achieved once the linguistic barrier has been overcome.

SOCIAL STATUS AND DEPRIVATION

Consistent use of health-care services is often influenced by an individual's economic status. An individual's social status can affect access to education and therefore understanding of health-care issues. As mentioned earlier, amongst those whose educational attainment is limited, religious and cultural factors may have a greater influence, thereby affecting attitudes to health (McAvoy and Donaldson, 1990). Differences in social status will influence levels of communication and tolerance, and there may be a barrier to effective communication if a health-care worker is perceived to be of a different social class (McAvoy and Donaldson, 1990).

Deprivation has been emphasised as one of the factors linked with increased prevalence of NIDDM and diabetes associated complications (Kelly, et al., 1993; Meadows, 1995; Chaturvedi et al., 1996). Eachus and colleagues (1996) demonstrated the positive relationship between diabetic eye disease and deprivation in an individual. This relationship may reflect poor diabetic control, adherence or screening for the deprived population (Eachus et al., 1996). Risk factors for the complications of diabetes (smoking, hypertension, obesity, high glycated haemoglobin, hyperlipidaemia, and blood glucose levels) have been shown to be more prevalent among those from deprived areas (Unwin et al., 1995; Kelly et al., 1994). Diabetes is less well controlled among those most deprived (Leese et al., 1995), and the uptake of invitations to primary care health promotion sessions for the population has been shown to fall with social class (Waller et al., 1990). Access to and use of health care may be affected by the individual's deprivation. For example, no access to a telephone communication prevents a patient from booking and postponing a clinic appointment; no access to private transport may prevent, especially a female Asian or the elderly, from attending a diabetic clinic.

Complaining behaviour

It has been argued that there is a tendency amongst Indo-Asians towards optimism and a reluctance to express dissatisfaction with their living and working conditions, even if these are generally worse than those of the general population (Williams et al., 1994; MORI, 1995). This may be because the expression of dissatisfaction is less acceptable in Indo-Asians cultures or expectations are framed in relation to a favoured economic group in the Indian subcontinents (Williams et al., 1994). Qureshi (1986) warns GPs not to assume that an Indo-Asian patient thinks along the same lines as a British patient. These Indo-Asian patients may feel worried about annoying the doctor and are therefore likely to tell a British GP what they think the GP wants to hear, rather than the real facts.

USE OF MEDICINAL PLANTS FOR DIABETES MELLITUS

Despite the discoveries of insulin and anti-diabetic drugs, medicinal plants are still widely used, typically among the first generation of British Indo-Asians (Pawa, 1989; Qureshi, 1989). There are more than 700 different plants world-wide known to have a hypoglycaemic property (Day, 1989) many of which are utilised overtly in developing countries and in ethnic minority groups of England (Table 4b and 4c).

Table 4b. Dietary adjuncts used mainly by immigrants to the UK (Day, 1995)

Aloe vara	*Aloe vera*	Leaf and juice
Cerasee	*Momordica charantia* (wild)	Aerial parts
Cucurbitaceae	*Coccinia indica*	Leaf
Guava	*Psidium guajava*	Fruit and leaf
Karela	*Momordica charantia* (cultivated)	Fruit
Lychee	*Lycium chinense*	Fruit and seed
Indian cluster bean	*Cyamopsis tetragonolobus*	Seed
Mistletoe	*Viscum album*	Leaf
Pawpaw	*Carica papaya*	Fruit
Tamarind	*Tamarindus indica*	Fruit and seed
Turmeric	*Curcuma*	Bulb

Table 4c. Some traditional plant treatments for diabetes used as dietary adjuncts in the UK (Day, 1995)

Herbs and spices	**Latin names**	**Part used**
Agrimony	*Agrimonia eupatoria*	Leaf
Burdock	*Arctium lappa*	Leaf
Chile pepper	*Capsicum fructescens*	Seed
Coriander	*Coriandrum sativum*	Seed
Dandelion	*Taraxacum officinale*	Root and leaf
Ginger	*Zingiber officinale*	Root
Liquorice	*Glycyrrhiza glabra*	Root
Nettle	*Urtica dioica*	Arial parts
Sage	*Salvia officinale*	Leaf
Tarragon	*Artemisia dranunculus*	Leaf
Thyme	*Thymus vulgaris*	Leaf
Vegetables		
Cabbage	*Brassica oleracea*	Leaf
Celery	*Apium graveolens*	Aerial parts
Garlic	*Allium sativum*	Bulb
Haricot bean	*Phaseolus vulgaris*	Pod

Table 4c. Some traditional plant treatments for diabetes used as dietary adjuncts in the UK (Day, 1995) (continued)

Herbs and spices	Latin names	Part used
Leek	*Allium porrum*	Aerial parts
Lettuce	*Luctuca sativa*	Leaf
Mushroom	*Agaricus bisporus*	Fruiting body
Onion	*Alliun cepa*	Bulb
Pea	*Pisum sativum*	Seed
Potato	*Solanum tuberosum*	Tuber
Sweet corn	*Zea mays*	Style
Turnip	*Brassica rapa*	Root
Fruits		
Apple	*Pyrus malus*	Fruit
Blackberry	*Rubus fructicosus*	Leaf
Blueberry	*Vaccinium myrtillus* L.	Leaf
Elder	*Sambucus nigra*	Leaf
Hop	*Humulus lupulus*	Leaf
Juniper	*Juniperus communis*	Berry
Lemon	*Citrus limonum*	Fruit
Lime	*Tilia europa*	Fruit
Raspberry	*Rubus idoeus*	Aerial parts

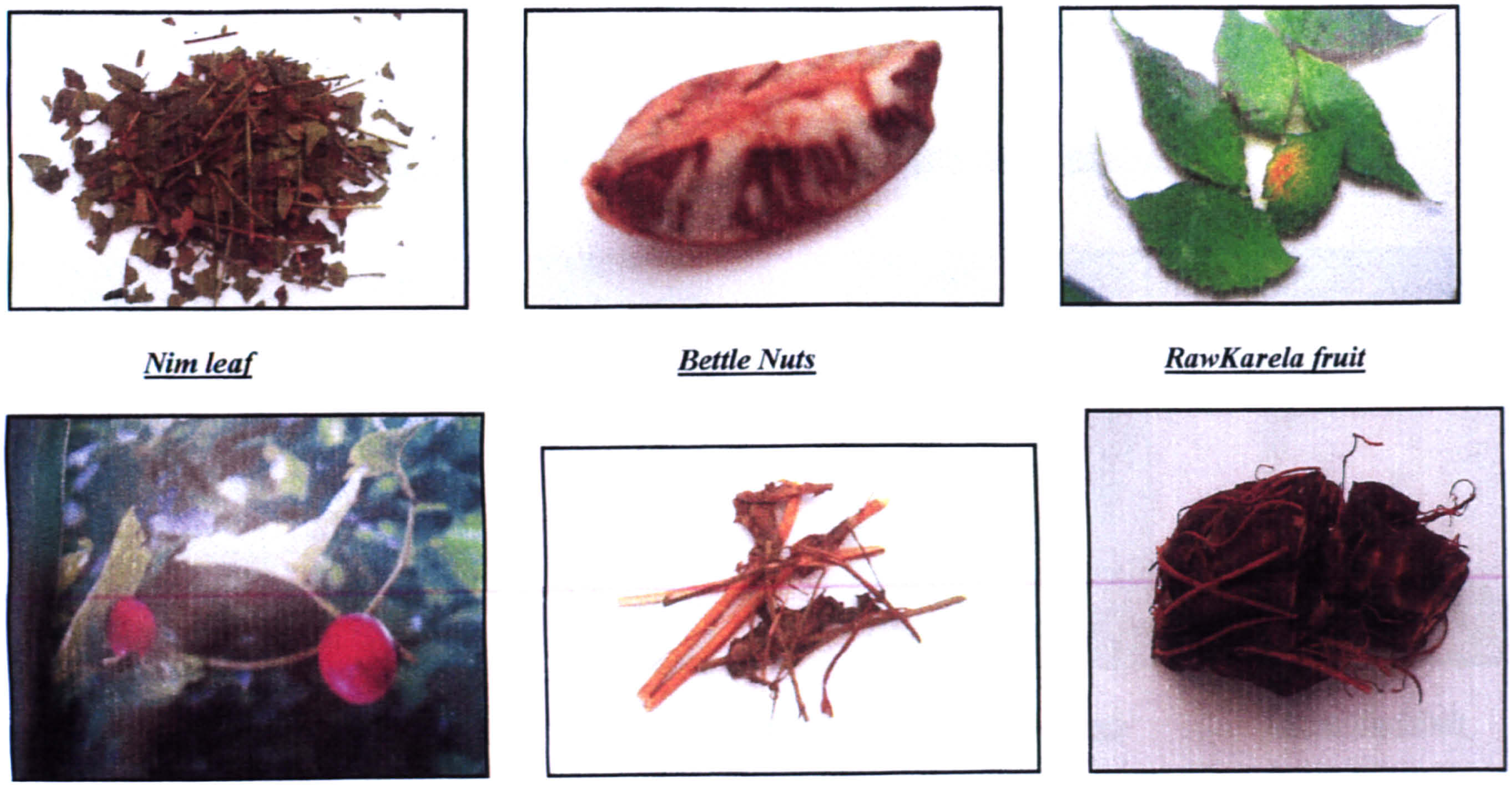
Many of the plants shown in Table 4b and 4c may owe their reputation to a high fibre, mineral or vitamin content, and few have been scrutinised. However, several have yielded hypoglycaemic principles such as the propyl disulphides from haricot bean pods, onion bulbs and the leaves of *Brassica* species (Day and Brailey, 1988; Brailey and Day, 1989). Guandidine is a known hypoglycaemic component of goat's rue, and uncharacterised hypoglycaemic fractions have been obtained from sweet corn, coriander and agrimony (Day and Brailey, 1988; Brailey and Day, 1989; Swanston-Flatt et al., 1990). Myrtillin occurs in all green plants and the leaf of blueberry extract has a physiological effect on in the normal carbohydrate metabolism of plants and perhaps of animals. It did not cause hypoglycaemia in experimental dogs but tended to stabilise blood sugar, both in experimental dogs and some patients with diabetes, especially children, who have been subject to troublesome hypoglycaemic attacks from insulin (Allen, 1927).

Although the use of herbal alternative medicines is thought to be quite extensive locally, there are only a few plants with hypoglycaemic properties confirmed in controlled human trials (Baldwa et al., 1977; Akhtar, 1982; Leatherdale et al., 1981). Numerous detailed listings of known hypoglycaemic compounds from plants have been published (Allen, 1927; Akhtar et al., 1982; Ali et al., 1993; Welihinda et al., 1982; Higashino et al., 1992; Yaqub et al., 1980; Raza et al., 1996; Kedar and Chakrabarti, 1981). However for, many plant species, hypoglycaemic properties are known only through animal models. The results cannot always be transferable to human. These models can be difficult to interpret, and many were poorly characterised or inappropriately analysed, and the purity of some preparations or extractions was unconfirmed.

A study carried out in South Glasgow illustrated that relatively few Indo-Asian people consulted healers or used traditional remedies, apart from those, which they saw as convenient, safe, inexpensive and effective. These remedies appear to be an alternative to 'over the counter' drugs for chronic problems and secondary to professional consultation (Bhopal, 1986). It was concluded that the use of traditional Asian medicines is not a major concern, although health workers need to be alerted to what may be a potential health hazard. For example, karela (bitter melon or bitter gourd) (Figure 4.4) has been reported to interfere with diabetic control (Bhopal, 1986; Pawa, 1989; Qureshi, 1989). However, another study of nine Asian diabetics showed that karela improves glucose tolerance in diabetes, particularly when the raw juice is consumed (fasting glucose level was decreased from 248 $\pm$ 20 to 155 $\pm$ 23 mg%) (Leatherdale et al., 1981). The authors urge doctors, who might be treating patients from Indian subcontinent to be aware of the hypoglycaemic properties of this fruit.

Table 4d illustrates 22 publications relating to case reports or historical use of medicinal plants with hypoglycaemic activity in humans, as reviewed by Ernst (1997). Ernst criticised many of them for having been conducted using poor methodological standards, e.g. without controls (Augusti et al., 1975; Baskaran et al., 1990; Diaz et al., 1990; Frati-Munari et al., 1992; Kiesewetter et al., 1991; Korotkova et al., 1989; Leatherdale et al., 1981; Russo et al., 1990), and others lacked proper randomisation and/or blinding (e.g. Rahman et al., 1989; Fernando et al., 1991; Frati et al., 1990; Frati et al., 1991; Frati-Munari et al., 1988; Frati-Munari et al., 1989a, Iyer et al., 1992). There were only five randomised control trials from the 22 publications. However, none of them seemed to demonstrate clearly the effectiveness of plants in patients (Frati et al., 1990; Hale et al., 1988), and many studies were based on very small samples and were poorly designed (Meshcheriakova et al., 1995; Kiesewetter et al., 1991; Russo et al., 1990), which means the value of these plants remains equivocal.

Figure 4.4 Traditional Asian medicinal plants for diabetes mellitus



Nim leaf — *Bettle Nuts* — *RawKarela fruit*

Cucurbitaceae (fruit) — *Sarota* — *Dried Tamarind*

Figure 4.4. Traditional Asian medicinal plants for diabetes mellitus (Continued)

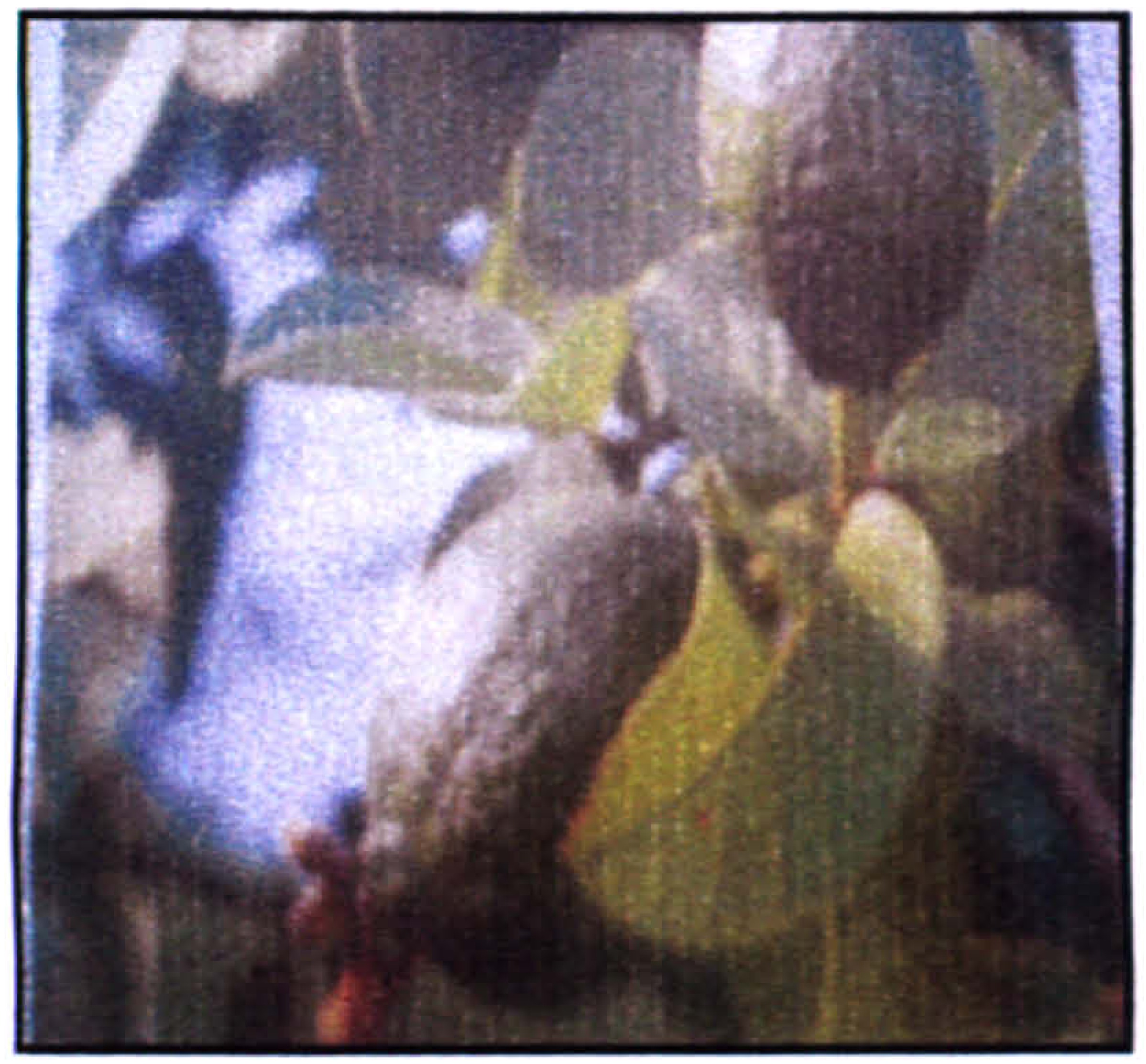
Comercial Karela juice

Aloe Vera

Cucurbitaceae (leaf)

Tamarind fruit

Figure 4.4. Traditional Asian medicinal plants for diabetes mellitus (Continued)



Guava fruit and leaf

Carica papaya fruit

Dried crushed turmeric bulb

Turmeric plant

Table 4d. Plants with hypoglycaemic activity in humans reviewed by Ernst (1997)

First author & year of publication	Plant	Sample	Dose	Controls	Trial design	Results	Comments
Augusti et al. 1975	*Allium cepa*	6 healthy subjects	0.125 g of essential oil/50kg body weight	No medication	Randomised cross-over trial	Glucose fell from 750±2.4 to 63±2.3mg/ 100ml and insulin rose from 7±1.6 to 11±24.4 units/ml	No blinding, only acute effects
Baskaran et al., 1990	*Gymnema sylvestre*	22 NIDDs	400mg plant extract/day for 18 - 20 months	none	Uncontrolled study	Significant reduction in glucose and HbA1c, increased insulin levels	All patients also received conventional treatments; 5 could discontinue this
Diaz et al., 1990	*Lupine bull*	16 NIDDs	10g for months 20g for following months	none	Uncontrolled study	Glucose increased with 10g, cholesterol decreased, no changs in BMI, HDL, triglycerides, HbA1c and insulin	Inconclusive finding
Fernando et al., 1991	*Artocarpus heterophyllus* & *Asteracanthus longifolia*	?	20g/kg body weight	none	2 uncontrolled studies	Both plants improved glucose tolerance	Essential methodological, details Are missing; open study

Table 4d. Plants with hypoglycaemic activity in humans reviewed by Ernst (1997) (Continued)

First author & year of publication	Plant	Sample	Dose	Controls	Trial design	Results	Comments
Frati et al., 1991	*Opuntia streptacantha*	8NIDDs & 6 healthy subjects	1) 500g broiled stems 2) 2 X 500g hourly	water	Cross-over trial	41-46% fall of glucose in NIDDs with both dose after 2 hours; no changes in healthy volunteers	No randomisation, no blinding, only acute effects
Frati-Munari et al., 1988	*Opuntia streptacantha*	26 NIDDs.	500g of broiled stems	400ml of water	Controlled trial with 2 parallel groups	Glucose decreased by 17.6±2.2% and insulin by 50±8% 180 min after medication in experimental group; no changes in control group	No randomisation, no blinding, only acute effects
Frati-Munari et al., 1989a	*Opuntia streptacantha*	8 NIDDs	100g, 300g or 500g or broiled stems	water	Cross-over study	Dose-dependent effect on glucose levels; maximal decrease 47% at higher dose after 180 min	No randomisation, no blinding, only acute effects
Frati et al., 1990	*Opuntia streptacanta*	1) 14 NIDDs 2) 14 healthy volunteers	500g of plant	400ml of water	Randomised cross trial	Serum glucose in patients decreased 2±0.3mM below baseline 180min after plant; similar effects in insulin levels; no effect following water administration; no effect in healthy volunteers following either intervention	No blinding, only acute effects

Table 4d. Plants with hypoglycaemic activity in humans reviewed by Ernst (1997) (Continued)

First author & year of publication	Plant	Sample	Dose	Controls	Trial design	Results	Comments
Frati-Munari et al., 1989b	*Supernatant; Precipitate; Complete homogenate of 500g Opuntia streptacantha*	8 NIDDs	500g of broiled stems	water	Cross-over study	No effect of crude extracts; broiled extracts lead to 48% drop of glucose level after 180 min	No randomisation, no blinding , only acute effects
Frati-Munari et al., 1992	*Opuntia ficus indica*	24 NIDDs	30 capsuls/day	30 placebo capsules	Single blind cross-over study	Discrete beneficial effect on glucose	Effect is not clinically relevant, dose impractical
Ghannam, 1986	*Aloe barbadensis*	5NIDDs	½ teaspoon daily none for 4-14 weeks	none	Uncontrolled study	Fasting serum glucose from 273±25 to 151±23 mg/dl; no changes in body weight or insulin levels; HbA1c fell from 10.6 to 8.2%; no side-effects	Inconclusive finding, no information on diet or other concomitant therapies
Hale, 1986	Uncharacterised Chinese herbal tea	12 NIDDs	1 cup of tea 4 x daily for 4 weeks	Ordinary tea	Randomised cross-over trial	No effect on any outcome measure	Possibly underdosaged, small sample size
Frati-Munari et al., 1989b	*Supernatant; Precipitate; Complete homogenate of 500g Opuntia streptacantha*	8 NIDDs	500g of broiled stems	water	Cross-over study	No effect of crude extracts; broiled extracts lead to 48% drop of glucose level after 180 min	No randomisation, no blinding, only acute effects

Table 4d. Plants with hypoglycaemic activity in humans reviewed by Ernst (1997) (Continued)

First author & year of publication	Plant	Sample	Dose	Controls	Trial design	Results	Comments
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Table 4d. Plants with hypoglycaemic activity in humans reviewed by Ernst (1997) (Continued)

First author & year of publication	Plant	Sample	Dose	Controls	Trial design	Results	Comments
Kiesewetter, 1991	*Allium sativum*	30 healthy	800mg dried powder for 35 days	placebo	Randomised, placebo controlled, double-blind	Glucose fell significantly from 89 to +9mg/dl in active group; no change with placebo	This study was not aimed at detecting changes in glucose levels; findings require confirmation
Korotkova, 1988	*Arfazetin + diet*	32 NIDDs	Not specified	none	Uncontrolled study	"the plant had hypoglycaemic activity"	Essential methodological details missing
Korotkova et al., 1989	*Natural fibre; refined fibre with pectin*	41 NIDDs	Not specified none	none	Uncontrolled study	Postprandial rise in glucose was attenuated	-
Leatherdale et al., 1981	*Momordica charantia*	9 NIDDs	1) 50ml karela juice; 2) 0.23kg fried karela for 8-11 weeks	No karela	Cross-over trial	1) glucose levels and glucose tolerance improved 2) HbA1c fell significantly	No randomisation, small sample size
Iver, 1992	*Solanum torvum*	30 NIDDs	7g + hypoglycaemic drugs	none	Uncontrolled study	No changes of glucose, lipids, glycated proteins	Uncontrolled study
Madar et al., 1988	Fenugreek	21 NIDDs	15g of ground fenugreek added to a standardised test meal	Test meal without fenugreek	Cross-over trial	Prosprandial increase of glucose was less with fenugreek	No randomisation, no blinding, no information on long-term medication
Meshcheriakova et al., 1995	*Cynara scolymus*	3 NIDDs	150g mashed plant/day	No such treatment	Randomised, open	Slight increase in postpradial hyperglycaemia in experimental group	Negative result

Table 4d. Plants with hypoglycaemic activity in humans reviewed by Ernst (1997) (Continued)

First author & year of publication	Plant	Sample	Dose	Controls	Trial design	Results	Comments
Russo et al., 1990	*Myrcia uniflora & Baubinia forficata*	18 NIDDs & 6 NIDDs	3g leaves/day for 56 days	Placebo	2 randomised double-blind cross-over trials	No acute or chronic effect except for lower insulin levels	Conclusive but negative findings
Thorburn et al., 1987	*Acacia coriacea*	6 healthy subjects	18g flour	None	Uncontrolled study	Reduction of postprandial rise in glucose levels	Inconclusive findings
Welihinda et al., 1986	*Momordica charantia*	NIDDs	Not specified	None	Uncontrolled study	Fruit juice of karela improved the glucose tolerance of 73% of the patients	Inconclusive findings

Usage of any kind of plants should never be introduced, unless rigorous tests in all phases of clinical trials are carried out (Grand et al., 1998). Lack of funding may be the major reason for the small number of plant clinical trials (Ernst, 1997).

There are, though, numerous surveys on attitudes of young doctors (Taylor, 1984), GPs (Fulder and Munro, 1988; White et al., 1997) and patients (Barnes et al., 1998) towards the usage of complementary medicine in the UK. In fact, a term 'complementary medicine' and 'alternative medicine' are thought to be unsuitable words (Fisher and Ward, 1994). Fisher and Ward believed that first term is not satisfactory because it seems to lump together a wide range of methods that have little in common except that they are outside the mainstream of medicine. While the latter term is vaguely disparaging and refers to heterogeneous categories defined by what they are not rather than by what they are (Pietroni, 1992). Hence Fisher and Ward introduced the term 'unconventional therapeutic methods'.

METHOD

Full details of design, modifications and translation, pilot studies and reliability of the interview-schedule and the scales for this study are presented in Chapter 2.

RESULTS

Characteristics of participants

The pool of potential participants (n = 784) comprised lists of diabetic patients from four General Practices situated in Foleshill, Coventry. Criteria for inclusion were: male or female; age between 15 to 85 years at time of diagnosis; patients with type 1 (insulin-dependent) or type 2 (non-insulin dependent) diabetes mellitus; patients who were born either in the Indian subcontinent (India, Pakistan and Bangladesh) or in the United Kingdom; patients who are currently resident in the UK. Exclusion criteria were: patients who were born with learning disability or suffer from severe diagnosed mental illness; patients who are alcohol and/or drug abusers.

The participants were randomly selected from this pool using random numbers generated by the Excel program. Five hundred and thirty three people with diabetes were approached. Fifty-one people, mainly of Indo-Asian origin, could not be contacted, either because of change of telephone numbers and addresses or because telephone numbers were unrecognised. Two had died and seventy-nine refused to be interviewed. Seventy five percent (n = 403/533) agreed to the interview. Letters from the General Practitioner (where obtainable) and researcher were sent out together. When letters were not responded to, a telephone call was made to the participants.

Four hundred and three participants were interviewed. One hundred and ninety-three of those originated from Indo-Asian countries (namely, India, Pakistani and Bangladesh). All quantitative data were obtained during face-to-face interviews. There were three different questionnaire versions available: English, Punjabi and Pakistani-Urdu. These were used in accordance with participants' stated language preference as indicated by the four General Practices participating in the study. A link worker who spoke Asian languages was employed where the interviewee might have felt uncomfortable being interviewed by the main interviewer who was an English speaking female of Thai appearance.

Résumé of questionnaire

The Questionnaire consisted of 7 parts (Appendix I).

Part 1. Demographic background

Part 2. Diabetes and related factors, including self-reliance

Part 3. A measure of psychological adjustment to diabetes

Part 4. Treatment satisfaction/dissatisfaction

Part 5. Self-care activities/behaviours

Part 6. Diabetes knowledge questions

Part 7. Usage of alternative treatments, predominantly use of plants and herbs

Cronbach's alpha coefficient was used to assess the reliability of scales. An alpha coefficient over .7 is considered to indicate adequate reliability (Pallant, 2001). Basic descriptive statistics for the scales in the questionnaire were as follows.

A measure of psychological adjustment to diabetes (PAD16). The mean score for the sixteen items was 55.16 (SD = 20.22), with a Cronbach alpha coefficient of .99.

Treatment satisfaction/dissatisfaction (TSF16). The mean score for the items was 57.42 (SD = 12.37), with a Cronbach alpha coefficient of .90.

Self-care activities/behaviour/adherence. There were six scales within this part of the questionnaire. Some of these scales comprised a single item, so their reliability could not be assessed using Cronbach's alpha coefficient.

1. Taking diabetes tablets: a six item scale, mean score = 19.62 (SD = 9.66), alpha = .90.
2. Insulin injections: a three-item scale, mean score = 1.66 (SD = 3.54), alpha = .85.
3. Diet: a three-item scale, mean score = 21.92 (SD = 3.67), alpha = .96.
4. Exercise: a single item scale, mean score = 2.64 (SD = 2.17).
5. Blood testing: a single item scale, mean score = 3.34 (SD = 2.70).
6. Diabetes clinic/appointment attending behaviour: a single item scale, mean score = 3.82 (SD = .41).

Diabetes knowledge questions (BDKQ) The mean score for the BDKQ was 14.20 (SD = 5.05) and Cronbach's alpha = .88.

The reliability and other statistics for these scales are summarised in Table 4.1. The alpha coefficients indicate adequate reliability.

Table 4.1: The reliability of scales

Scale	Number of items	Scale mean	Scale SD	Alpha
Psychological adjustment PAD-16	16	55.16	0.22	.99
Treatment satisfaction TSF-16	16	57.42	12.37	.90
Self care - tablets	6	19.62	9.66	.90
Self care - insulin	3	1.66	3.54	.85
Self care - diet	3	21.92	3.67	.96
Self care – exercise	1	2.64	2.17	
Self care – blood testing	1	3.34	2.70	
Self care - appointments	1	3.82	.41	
Diabetes knowledge BDKQ-28	28	14.20	5.05	.88

Part 1: Demographic information

Age and gender

The mean age was 59 years, and the youngest participant was 15 years old and the oldest one was 82 years old. There were 221 male participants (54.8% of the sample, mean age = 59.05 years) and 182 female participants (45.2%, mean age = 59.02 years). Age and gender distributions are shown in Table 4.2. Age and gender were not significantly related ($\chi^2(4) = 2.28, p = .68$).

Table 4.2: Age and gender distributions of participants

Age group	Gender		Total
	Male	Female	
≤35	14	9	23
36-45	18	19	37
46-55	46	33	79
56-65	53	52	105
66+	90	69	159
Total	221	182	403

Country of origin, country of birth, and native language

Regarding a definition of country of origin of the respondents, it is not known if it is the same as the countries where mother and father were from, as there was a large number of unrecorded answers for countries of birth of both parents (Q.2 of Appendix A-3). Therefore the definition of country of origin, in this study, could only rely on an answer given by the responders through the five-response, options provided.

Country of origin and country of birth (Table 4.3) are significantly related $\chi^2(16) = 94$, $p < .0005$). (In this and subsequent chi-square analyses where some cells had expected frequencies less than 5, significance was checked using a Monte Carlo test procedure based on 10,000 sampled tables.) Most participants (86.8%) were born in the same country as they described as their country of origin (Table 4.3). The median duration of residence of the 193 migrants was 15.97 years with a range of 4 – 65 years.

Table 4.3. Participants' country of origin by country of birth

Country of origin	Country of birth					Total
	UK	India	Pakistan	Bangladesh	Other	
UK	190				1	191
India	4	74	13	4	8	103
Pakistan	1	2	65		4	72
Bangladesh				21		21
Other	15		1			16
	210	76	79	25	13	403

For subsequent analyses, country of birth was re-coded into two categories: born in the UK (N=210), and born in an Asian country (India, Pakistan, Bangladesh and other, N=193). Fifteen participants of the UK-born group originated from other countries (3 from Trinidad and Tobago, 10 from East Africa, 1 from Malaysia, and 1 from Canada) and one participant of the Pakistan-born group originated from Afghanistan, and were classed as "other". Table 4.4 shows the age and gender distributions of participants in these two categories. There were no significant differences between the categories for either age ($\chi^2(4) = 4.72, p = .32$) or gender ($\chi^2(1) = 3.14, p = .08$).

Table 4.4: Age and gender of participants by country of birth

Age group (years)	Asian born		UK born	
	Male	Female	Male	Female
≤35	5	2	9	7
36-45	7	13	11	6
46-55	23	16	23	17
56-65	25	30	28	22
66+	37	35	53	34

Not surprisingly, there was a close correspondence between native language and country of birth, to the extent that all UK-born participants reported English as their native language, and only 15 participants born in an Asian country reported English as their native language (Table 4.5). Therefore, for this sample, the variable that codes country of birth as UK or Asian carries essentially the same information as the variable that codes native language as either English or an Asian language.

Table 4.5: Participants' native language by country of birth

Native language	Country of Birth					Total
	UK	India	Pakistan	Bangladesh	Other	
English	210	8	6		1	225
Punjabi		57	7		9	73
Gujarati		8	2		2	12
Pakistani Urdu		2	62		1	65
Bengali		1		25		26
Mirpuri			2			2
Total	210	76	79	25	13	403

Religion

Religion is one of the factors which most likely influences patients' health beliefs. There were five specific religions documented in the sample, predominated by Christianity and Islam (Muslim). In the sample, there was a very significant relationship between country of birth and religious belief (χ^2 (16) = 59.44, $p < 0.0005$, Table 4.6). Ninety seven percent of Christians were born in the UK, while the remainder were born in India. Sixty-four percent of Muslims (Islamic believers) were born in Pakistan and twenty-one percent were born in Bangladesh. Sikhs were mostly (84%) born in India.

The binary classification of country of birth (born in UK versus born in an Asian country) has a very high degree of association with the five-fold classification of religions (phi coefficient = .925). Therefore, in this sample, religious belief carries very little additional information over country of birth.

Table 4.6: Participants' religious belief by country of birth

Religious belief	Country of Birth					Total
	UK	India	Pakistan	Bangladesh	Other	
Christianity	176	6				182
Hinduism	2	12			1	15
Islam	1	14	76	25	3	119
Sikhism	1	43	2		5	51
Other	30	1	1		4	36
Total	210	76	79	25	13	403

There was a weak but statistically significant difference between the genders in the distribution of religious beliefs (χ^2 (4) = 12.16, p = .016). Females were more likely to describe themselves as following Islam, and less likely to use the "Other" category to describe their religious beliefs (Table 4.7).

Table 4.7: Distribution of religious beliefs by gender.

Gender	Religious belief					Total
	Christianity N=182	Hinduism N=15	Islam N=119	Sikhism N=51	Other N=36	
Male	46.2%	4.5%	25.8%	10.9%	12.7%	100%
Female	44.0%	2.7%	34.1%	14.8%	4.4%	100%
Overall	45.2%	3.7%	29.5%	12.7%	8.9%	100%

Participant's religious belief was also associated with their age (Table 4.8). Analysis of Variance revealed significant differences in mean age among the religious belief categories, $F(4,398) = 7.77$, $p<.0005$. Post hoc Tukey tests indicated that participants reporting their belief as belonging to the "Other" category were significantly younger than participants in each of the remaining categories, and Christians had a significantly lower mean age than followers of Islam. The mean age of Christians was very similar to the mean age of Hindus and Sikhs. Contrasts of the Hinduism and Sikhism groups with Islam were not significant, although these contrasts are less powerful because of relatively small numbers of participants in the latter two groups.

Table 4.8: Mean age of participants by religious belief.

	Religious belief					Overall
	Christianity N=182	Hinduism N=15	Islam N=119	Sikhism N=51	Other N=36	
Mean age (years)	61.5	61.2	57.2	60.3	49.8	59.0
SD	11.1	9.5	13.3	11.5	16.7	12.8

Family composition - marital status and children

Five categories were made available for marital status classification: single; married; divorced; separated and widowed. For those whose marital status is not within these five categories, '*other*' was an optional answer. Overall, the majority of (74%) participants were married, but the distribution of marital status categories differed by country of birth (χ^2 (4) = 31.64, exact $p < 0.0005$, Table 4.9). A higher percentage of Asian born participants were married, and fewer were single, compared to UK born participants.

Table 4.9. Participant's marital status by country of birth

Country of Birth	N	Marital status						
		Single	Married	Divorced	Separated	Widowed	Other	Total
Asian	193	1.6%	82.4%	-	.5%	15.5%	-	100%
UK	210	15.2%	67.1%	1.9%	-	14.8%	1.0%	100%
Overall	403	8.7%	74.4%	1.0%	.2%	15.1%	.5%	100%

There was also a marked difference between Asian-born and UK born participants in the numbers of children they had (χ^2 (3) = 58.30, p < 0.0005, Table 4.10). Just 1% of Asian born participants had no children, compared to over 16% of UK-born participants. The majority of UK participants had 3 or fewer children, but a majority of Asian-born participants had 4 or more. The higher number of UK-born participants without children seems to be a consequence of the larger number of single persons in that group, as single UK-born participants mostly had no children (Table 4.11). Nonetheless, excluding all single persons from the analysis still leaves a significant difference between UK-born and Asian-born participants in the numbers of children (χ^2 (3) = 32.54, p < 0.0005).

Table 4.10: Distribution of number of children by country of birth

Country of Birth	N	Number of children				Total
		none	1-3	4-6	7+	
Asian Country	193	1.0%	43.0%	47.2%	8.8%	100%
UK	210	16.2%	60.0%	21.0%	2.9%	100%
Overall	403	8.7%	74.4%	1.0%	.2%	100%

Table 4.11: Number of children by country of birth and marital status.

Country of Birth	Children	Marital status						
		Single	Married	Divorced	Separated	Widowed	Other	Total
Asian	None	-	2	-	-	-	-	2
	1-3	1	73	-	-	9	-	83
	4-6	2	68	-	1	20	-	91
	7+	-	16	-	-	1	-	17
	Total	3	159	-	1	30	-	193
UK	None	25	4	1	-	3	1	34
	1-3	6	100	3	-	16	1	126
	4-6	1	32	-	-	11	-	44
	7+	-	5	-	-	1	-	6
	Total	32	141	4	-	31	2	210

Asian-born participants also had greater number of people living in their house, compared to UK-born participants (χ^2 (3) = 161.59, p < 0.0005, table 12). Very few Asian-born participants lived alone, and very few UK-born participants had more than 4 people living in the house.

Table 4.12: Number of people living in participants' house by country of birth

Country of Birth	N	Number of people living in house				Total
		Alone	2-4	5-7	8+	
Asian Country	193	2.1%	35.8%	49.7%	12.4%	100%
UK	210	26.2%	68.8%	5.2%	-	100%
Overall	403	14.6%	52.9%	26.6%	6.0%	100%

Education, employment and income

The participants' level of education varied by gender and country of birth (Table 4.13), with higher levels among UK born participants (χ^2 (3) = 131.74, p<.0005), and among males (χ^2 (3) = 89.98, p<.0005).

Table 4.13: Educational level by gender and country of birth

	Asian born			UK born		
Education	Male N=97	Female N=96	Total N=193	Male N=124	Female N=86	Total N=210
None	6.2%	70.8%	38.3%	-	2.3%	1.0%
Five years and less	35.1%	13.5%	24.4%	1.6%	23.3%	10.5%
Five years and over	45.4%	12.5%	29.0%	89.5%	64.0%	79.0%
Higher education (College/University)	13.4%	3.1%	8.3%	8.9%	10.5%	9.5%
Total	100%	100%	100%	100%	100%	100%

It is rather surprising that 24 participants who reported being born in the UK also reported that they had less than five years schooling, or none at all. However, the two UK-born participants (both female) who reported no schooling were both in the 66+ age group. Of the 22 reporting less than five years schooling (2 male, 20 female), 17 were in the 66+ age groups, and might legitimately have missed compulsory secondary schooling. Nonetheless, it seems likely that a few participants misreported their educational level or country of birth.

The relationships of age with educational level, gender and country of birth are summarised in more detail in Table 4.14. It is apparent that, on average, the higher the level of education reached by participants in the sample, the younger they are (though this is less clear for Asian born males). Presumably this reflects the recent history of improvements in educational opportunity. It is also apparent that, for similar levels of education, females are younger than males, suggesting that improved educational opportunity has come more recently for females than for males. Age, gender and country of birth (UK versus Asian) were used as predictors of the four-point scale of educational level in a multiple regression analysis. Age, gender and country of birth were all found to be independent significant predictors: age, $t(399) = 5.85$, $p<.0005$; gender, $t(399) = 10.48$, $p<.0005$; country of birth, $t(399) = 12.44$, $p<.0005$; $R^2 = .45$.

Table 4.14: Mean age (years) by educational level, gender and country of birth

Educational level	Asian born		UK born	
	Male	Female	Male	Female
None	62.3	62.6	-	79.0
Five years and less	62.4	53.2	77.0	66.1
Five years and over	54.4	52.5	60.6	56.0
Higher education (College/University)	60.7	40.7	44.6	53.3
Overall	58.4	59.4	59.4	58.6

Not surprisingly, there was a strong relationship between income and employment status $\chi^2(15) = 423.81, p < 0.0005$, Table 4.15). Since the mean age of the participants was 59 years, it is not surprising that many were pensioners and many had a monthly income in the range £1-£500.

Table 4.15: Participants' monthly income by employment status

Employment	Monthly income				Total
	None	£1-500	£501-1000	£1001-1500	
Full-time employment		1	6	15	22
Part-time employment	1	13	21	1	36
Unemployed	-	25	-	-	25
Housewife/husband	25	21	2	-	48
Pensioner	7	178	20	3	208
Other	2	58	4	-	64
Total	35	296	53	19	403

Female participants tended to report lower income bands than males (table 16). This was significant for both Asian born participants ($\chi^2(3) = 28.33$, $p<.0005$) and UK born participants ($\chi^2(3) = 17.54$, $p = .001$). Participants born in Asian countries tended to have lower incomes than those born in the UK ($\chi^2(3) = 40.35$, $p<.0005$).

Table 4.16: Distribution of monthly income by gender and country of birth.

	Asian born			UK born		
Monthly income	Male N=97	Female N=96	Total N=193	Male N=124	Female N=86	Total N=210
None	3.1%	28.1%	15.5%	-	5.8%	2.4%
£1-£500	83.5%	68.8%	76.2%	65.3%	79.1%	71.0%
£501-£1000	7.2%	3.1%	5.2%	25.0%	14.0%	20.5%
£1001-£1500	6.2%	-	3.1%	9.7%	1.2%	6.2%
Total	100%	100%	100%	100%	100%	100%

Employment status was somewhat similar to income in the pattern of relationships with gender and country of birth (Table 4.17). Females were less likely to be employed than males, and more likely to be occupied in a housekeeping role ($\chi^2(5)$ = 49.05, p<.0005 for Asian born; ($\chi^2(5)$ = 36.52, p<.0005 for UK born). There were analogous differences between Asian born and UK born participants, irrespective of gender ($\chi^2(5)$ = 35.28, p<.0005).

Table 4.17: Distribution of employment status by gender and country of birth.

	Asian born			UK born		
	Male	Female	Total	Male	Female	Total
Employment status	N=97	N=96	N=193	N=124	N=86	N=210
Full-time employment	5.2%	-	2.6%	10.5%	4.7%	8.1%
Part-time employment	6.2%	4.2%	5.2%	16.1%	7.0%	12.4%
Unemployed	21.6%	2.1%	11.9%	.8%	1.2%	1.0%
Housewife/husband	1.0%	29.2%	15.0%	-	22.1%	9.0%
Pensioner	48.5%	55.2%	51.8%	50.0%	53.5%	51.4%
Other	17.5%	9.4%	13.5%	22.6%	11.6%	18.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

A multiple regression analysis was used to explore predictors of the four-point monthly income scale. Independent variables were age, gender, country of birth and the four-point educational level scale. Gender, country of birth and educational level were revealed to be independent significant predictors: gender, t(398) = 4.78, p<.0005; country of birth, t(398) = 3.44, p = .001; educational level, t(398) = 2.33, p = .020; R^2 = .19). Age had little predictive value independent of the other variables (t(398) = 1.21, n.s.) though it was significant when educational level was omitted from the regression analysis (t(399) = 2.00, p = .047 .

In summary, educational level predicts income. Gender and country of birth predict educational level and they also predict income independently of their influence on educational level. Age predicts educational level but not income except via its influence on educational level.

Part 2. Diabetes and related factors

This part examines three separate issues: (A) the nature of the participants' diabetes, treatments and complications; (B) their preferences for doctors' gender and ethnicity; and (C) their self-reliance.

(A) Diabetes and its treatment

A majority (79%) of participants reported that they received health care from general practitioners (Table 4.18).

Table 4.18: Distribution of health care provision

	N	Percent
GP only	319	79.2
Shared (GP + hospital)	68	16.9
Hospital only	16	4.0
Total	403	100.0

The mean self-reported number of years with diabetes was 26 years, with a minimum of 1 year and the maximum of 42 years. A large majority of the participants were using tablets in controlling their diabetes (Table 4.18a), the rest were using insulin injections or a combination of insulin injections and tablets.

Table 4.18a: Distribution of treatments

Treatment	No. of participants	Percent
Diet + tablets	324	80.4
Diet + insulin	49	12.2
Diet + tablets + insulin	30	7.4
Total	403	100.0

The number of diabetes tablets used per day ranged from 1 to as many as 8 tablets per day, with a mean of 3.6 (Table 4.19). The number of insulin injections taken per day ranged between 1 and 4 with a mean of 2.6 (Table 4.20).

Table 4.19: Number of diabetes tablets taken per day

Number of tablets taken/day	Number of participants	Percent
1.00	36	10
2.00	54	15
3.00	144	41
4.00	28	8
5.00	18	5
6.00	42	12
7.00	9	2
8.00	25	7
Total	354	100.0

Table 4.20: Number of insulin injections per day

Number of insulin injections/day	Number of participants	Percent
1.00	1	2.5
2.00	55	67
3.00	1	2.5
4.00	22	28
Total	79	100.0

Usage of tobacco and betel-nut

It has been estimated that 50 percent of premature deaths from heart disease are due to smoking, and that smoking also triples the risk of heart attack (Diabetes UK, 2001). Worryingly, the risk of cardiovascular disease will increase significantly within the people with diabetes who are smokers.

Six percent (N = 24) of the participants admitted to a smoking habit. These participants reported smoking between 4 and 40 cigarettes per day (mean = 15) and they had been smoking between 10 and 50 years (mean = 35). Smokers were more likely than non-smokers to have been born in the UK ($\chi^2(1) = 9.97$, $p = .002$), and more likely to be female ($\chi^2(1) = 4.77$, $p = .029$).

It is thought by Asian folklore that chewing of betel nut strengthens teeth (personal experience with folklore). Use of betel nuts was very significant amongst the participants born in Bangladesh. Twenty-eight (6.9%) participants reported using betel nuts, of which 24 were born in Bangladesh, leaving only one of the 25 Bangladesh born participants not using betel nuts. The other betel nut users were born in India (3) and Pakistan (1). Betel nut users were predominantly male (75%). It was reported that they had used betel nuts for between 11 and 55 years (mean = 34 years), and that they used between 2 and 6 nuts per day (mean = 3.6).

Body Mass Index (BMI)

The mean BMI was 26.44, the minimum mass was 19.06 and the maximum was 42.90. Five percent (n = 20) of the participants were classified as severely overweight and one participant was underweight (Table 4.21).

Table 4.21: Distribution of participants' body mass indexes

BMI	No. of participants	Percent
Lowest through 19.09	1	.2
19.10 – 26.40	205	50.9
26.41 – 27.80	99	24.6
27.81 – 31.10	78	19.4
31.11 – 45.40	20	5.0
Total	403	100.0

Key (Whitney and Rolfes, 1996):

Underweight (BMI = <20.7 for men and <19.1 for women)

Acceptable weight (BMI = 20.7 to 26.4 for men and 19.1 to 25.8)

Marginal overweight (BMI = 26.4 to 27.8 for men and 25.8 to 27.3 for women)

Overweight (BMI = 27.8 to 31.1 for men and 27.3 to 32.2 for women)

Severe overweight (BMI = 31.1 to 45.4 for men and 32.3 to 44.8 for women)

Morbid obesity (BMI = > 45.4 for men and > 44.8 for women)

Over half of the participants reported using of blood pressure tablets and the number used varied from 1 to 3 tablets per day (Table 4.22).

Table 4.22: Number of blood pressure tablets taken per day

Number of blood pressure tablets taken/day	No. of participants	Percent
None	178	44.2
1 tablet/day	185	45.9
2 tablets/day	32	7.9
3 tablets/day	8	2.0
Total	403	100.0

Genetics is thought to be an important factor in the cause of diabetes mellitus. Notably, 150 participants (37.2 percent) remembered their relatives having diabetes (Table 4.23).

Table 4.23: Family history of diabetes

Family history of diabetes	Number of participants	Percent
Yes	150	37.2
No	253	62.8
Total	403	100.0

Diabetic complications

The major complications of diabetes are (1) blurred vision; (2) cataracts; (3) blindness; (4) kidney disease; (5) nerve problems; (6) skin problems (redness, thinness and itchiness); (7) heart disease; and (8) feet problems (numbness, pins & needles, changes in shape of feet or a feeling of walking on cotton wool or pebbles).

One hundred and eleven participants (27.5%) reported being without any complications while the remaining 292 reported at least one of the eight categories of complications listed above. Sixty-three percent of participants reported encountering four or more of the different categories of (Table 4.24). The most frequently reported categories of complications were blurred vision, feet problems, nerve problems and skin problems, each of which were encountered by over half the participants (Table 4.25).

Table 4.24: Distribution of number of different complication categories reported

Number of complication categories encountered/person	No. of participants	Percent
None	111	27.5
1.00	12	3.0
2.00	10	2.5
3.00	18	4.5
4.00	116	28.8
5.00	63	15.6
6.00	60	14.9
7.00	12	3.0
8.00	1	.2
Total	403	100.0

Table 4.25: Number of participants reporting each category of complications

Complication category		Number of participants	Percent
1	Blurred vision	275	68.2%
2	Cataracts	90	22.3%
3	Blindness	2	0.5%
4	Kidney disease	63	15.6%
5	Nerve problems	237	58.8%
6	Skin problems	232	57.6%
7	Heart disease	153	38.0%
8	Feet problems	265	65.8%

The association between diabetic complications and demographic characteristics

It is well known that demographic factors predict the success of health care, and the severity of illness. It was therefore likely that certain demographic factors would be associated with the occurrence of complications. A number of demographic factors were examined from this perspective. These were: gender; country of birth; educational level; age; and monthly income. These demographic factors were examined in two kinds of analysis: (1) Chi-square tests as to whether these demographic factors predicted which participants reported any complications (as opposed to none at all); (2) Analysis of Variance to explore whether these factors were related to the mean number of complication categories reported. The results are displayed in Table 4.26.

Table 4.26. Comparison between diabetics with and without complications

	Reporting any complications		Number of categories of complications	
	Percent	χ^2 test	Mean	ANOVA
Gender				
Male (N=221)	68.8%	$\chi^2(1)=3.32$	3.2	F(1,401)=0.92
Female (N=182)	76.9%	p=.069, n.s.	3.4	p=.337, n.s.
Country of birth				
Asian-born (N=193)	83.4%	$\chi^2(1)=22.31$	3.9	F(1,401)=28.71
UK-born (N=210)	62.4%	p<.0005	2.7	p<.0005
Age				
≤35 (N=23)	91.3%		4.6	
36 to 45 (N=37)	78.4%		3.6	
46 to 55 (N=79)	62.0%		2.6	
56 to 65 (N=105)	75.2%		3.4	
66 + (N=159)	71.7%	$\chi^2(4)=11.61$, p=.055, ns	3.3	F(4,398)=3.89, P=.004
Monthly income (£)				
None (N=35)	71.4%		2.8	
£1 – 500 (N=296)	78.7%		2.2	
£501 – 1000 (N=53)	41.5%	$\chi^2(3)=32.09$	2.1	F(3,399)=7.58
£1001 – 1500 (N=19)	63.2%	p<.0005	2.6	P<.0005
Educational level				
None (N=76)	82.9%		3.8	
< Five years (N=69)	76.8%		3.4	
Five years + (N=222)	66.7%	$\chi^2(3)=9.04$	3.0	F(3,399)=2.10
Higher education (N=36)	77.8%	p=.029	3.5	p=.099, n.s.

The results present a complicated picture. There is good evidence that complications are more likely among Asian born participants than among those born in the UK. There is evidence that age predicts the number of categories of complications reported, but the trend across age groups is not simple. The linear correlation between number of categories of complications age (raw number of years, not grouped into bands) was $r=-.065$, $p=.19$, n.s.).

The quadratic component was significant ($r = .394$, $p = .007$) so it may be that there are two processes involved: diabetes diagnosed in the youngest patients may be particularly likely to be accompanied by complications, and the likelihood of complications is likely to increase as patients get older.

There is good evidence that income levels predict the prevalence of complications, both on a presence/absence basis and in terms of the number of categories reported. However this too is non-monotonic (linear correlation $r = -.121$, $p = .015$, quadratic component $r = .155$, $p = .008$), although the upswing at the highest level of income is based on a relatively small N. There is evidence that educational level predicts complications, but this is only statistically significant for whether or not any complications are reported, not for the number of categories reported. Again, there does not seem to be a monotonic trend downward in the reporting of complications as educational level increases. Instead, there is an upswing at the highest level of education.

To throw further light on these findings, logistic regression was used to examine how these demographic variables in combination would predict whether or not a participant reported any complications, and an ANOVA was used to examine how they predicted the number of categories reported. It was not possible to include interactions in the ANOVA model because of the problem of empty cells. Since regression analyses are conventionally (but not necessarily) run without interactions, there is a close parallel between this ANOVA and the logistic regression.

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The results of the logistic regression are displayed in Table 4.19. Income level and country of birth were significant independent predictors. It is not surprising that these two variables had absorbed the predictive potential of educational level and gender. The odds ratio for country of birth indicated that the odds that a participant born in an Asian country would report complications was 3.3 times as high as a UK born participant. For monthly income, the only polynomial contrast that was significant was the cubic component, confirming that the effect of income was non-monotonic. From Table 4.27, it might appear that there was near-significant effect of age, but none of the polynomial contrasts among the age groups were significant.

Table 4.27: Logistic regression predicting whether or not a participant reported experiencing any complications.

Factor	Wald χ^2	df	p-value
Gender	.967	1	.325
Educational level	.570	3	.903
Monthly income	24.277	3	<.0005
Age group	11.029	4	.062
Country of birth (UK/Asian)	10.849	1	<.0005

Model Summary: Cox & Snell R^2 = .15; Nagelkerke R^2 = .21.

The results of the Analysis of variance on number of complications are displayed in Table 4.28. Monthly income and country of birth are again significant, and age group is too. The hint of an effect of educational level found in the single-factor ANOVAs in Table 4.26 has disappeared now that income, age and country of birth have been included in the model. The means fitted by the model are displayed in Table 4.29. Among the monthly income levels, the £1-£500 band stands out as having a high number of categories of complications, as do the two youngest age bands.

Table 4.28: Analysis of variance on the number of categories of complications.

Source	Sum of Squares	df	Mean Square	F	p-value
Gender	1.959	1	1.959	.422	.516
Educational level	2.508	3	.836	.180	.910
Monthly income	107.903	3	35.968	7.747	<.0005
Age group	99.826	4	24.956	5.376	<.0005
Country of birth (UK/Asian)	92.491	1	92.49	22.015	<.0005
Error	1810.605	390	4.643		

Table 4.29: Estimated means from the analysis of variance on the number of categories of complications

	Mean	SE	95% CI	
Gender				
Male (N=221)	2.989	.237	2.524	3.454
Female (N=182)	3.159	.235	2.696	3.622
Educational background				
None (N=76)	3.102	.354	2.406	3.798
< Five years (N=69)	2.905	.319	2.277	3.532
Five years + (N=222)	3.103	.233	2.646	3.561
Higher education (N=36)	3.186	.383	2.433	3.940
Monthly income (£)				
None (N=35)	2.465	.404	1.671	3.260
£1 – 500 (N=296)	3.960	.188	3.590	4.329
£501 – 1000 (N=53)	2.757	.323	2.121	3.392
£1001 – 1500 (N=19)	3.115	.516	2.101	4.128
Country of birth				
Asian-born (N=193)	3.698	.230	3.246	4.151
UK-born (N=210)	2.450	.250	1.955	2.944
Age				
≤ 35 (N=23)	4.402	.471	3.476	5.328
36 to 45 (N=37)	3.368	.374	2.630	4.100
46 to 55 (N=79)	2.173	.282	1.619	2.727
56 to 65 (N=105)	2.626	.274	2.257	3.335
66+ (N=24)	2.626	.257	2.121	3.132

In addition to demographic variables, it is to be expected that health care variables would be related to the severity of diabetes, and thus to the occurrence of complications. Table 4.30 shows a comparison of whether or not complications were reported according to the participants' treatment regime. Participants who were not receiving insulin were much less likely to report suffering any complications than those who were.

Table 4.30: Treatment for diabetes, and the occurrence of complications.

Type of treatment	N	Percent with complications	
- Diet + tablets	324	67.3%	
- Diet + insulin	49	93.9%	$\chi^2(2)=22.16$
- Diet + tablets + insulin	30	93.3%	p<.0005
Overall	403	72.5%	

Among the 324 patients who were not receiving insulin, there was a marked tendency for complications to be more likely among those participants reporting higher doses of tablets (Table 4.31). Also in this subgroup, there was a significant correlation between the number of tablets taken per day and the number of different complication categories reported (r = .243, p<.005). Among the 79 participants who were taking insulin, the number of injections per day were not discernibly related to either whether or not they reported any complications or the number of complication categories reported.

Table 4.31: Tablet dose and the occurrence of complications among participants not receiving insulin.

Tablet dose	N	Percent with complications	
- 1-2 tablets/day	79	63.3%	
- 3-4 tablets/day	152	57.2%	
- 5-6 tablets/day	59	83.1%	$\chi^2(3)=25.33$
- 7-8 tablets/day	34	94.1%	p<.0005
- Overall	324	67.3%	

(B) Preferences for a doctor's gender and ethnicity

Preferences for a doctor's gender and ethnicity were thought to be high among the Asian diabetics living in the UK, especially among the females with low educational background (Young, 1997). A number of factors might induce these preferences, for example gender, culture, economic status, and educational level.

Participants were asked whether they had a preference for a doctor's gender, and whether they had a preference for a doctor's ethnicity. Sixty-two participants (15.4%) reported having a preference for a doctor's gender, and 165 (40.9%) reported having a preference for a doctor's ethnicity (Table 4.32). Significantly more participants had a preference for ethnicity as compared to gender (McNemar's $\chi^2(1) = 90.68$, $p<.0005$). There was also a significant association between the two types of preference ($\chi^2(1) = 69.1$, $p<.0005$), with 70% of participants giving a similar response to the two questions. Both kinds of statistical test were clearly significant when computed separately for male and female participants.

Table 4.32: Distribution of responses to questions about preference for a doctor's gender and ethnicity

Preference for doctor's ethnicity	Preference for doctor's gender		Total
	Not at all	Yes	
Not at all	231	7	238 (59.1%)
Yes	110	55	165 (40.9%)
Total	341 (84.6%)	62 (15.4%)	403 (100.0%)

Participants were also asked to describe the ethnicity of a doctor who they regularly consult for their diabetes. Not surprisingly, Asian-born participants were more likely than UK-born participants to report consulting a doctor from an Asian origin (Table 4.32a). Leaving only 13 Asian-born participants (6.7 percent) reported visiting a British doctor and 2 were unable to identify the ethnicity of their diabetologist.

Table 4.32a: Reported ethnicity of a doctor treating diabetes

Country of birth	Ethnicity of doctor					χ^2 test
	British	Indian	Pakistani	Bangladeshi	Not known	
UK-born (N= 210)	53.81%	42.86%	3.33%			$\chi^2(4)= 128.13$
Asian-born (N= 193)	6.7%	60.1%	30.57%	1.50%	1.03%	$p<.0005$

Table 4.33: Association between demographic variables and reported preference for a doctor's gender and ethnicity.

	Reporting preference for doctor's gender		Reporting preference for doctor's ethnicity	
	Percent	χ^2 test	Percent	χ^2 test
Gender				
Male (N=221)	5.4%	$\chi^2(1)=37.25$	33.5%	$\chi^2(1)=11.263$
Female (N=182)	27.5%	$p<.0005$.	50.0%	$p=.001$
Country of birth				
Asian-born (N=193)	28.5%	$\chi^2(1)=48.92$	83.9%	$\chi^2(1)=283.16$
UK-born (N=210)	3.3%	$p<.0005$	1.4%	$p<.0005$
Age				
≤35 (N=23)	4.3%		4.3%	
36 to 45 (N=37)	16.2%		45.9%	
46 to 55 (N=79)	12.7%		40.5%	
56 to 65 (N=105)	14.3%		42.9%	
66 + (N=135)	18.7%	$\chi^2(4)=4.202$, $p=.379$, n.s.	45.0%	$\chi^2(4)=13.91$, $p=.008$

Table 4.33: Association between demographic variables and reported preference for a doctor's gender and ethnicity (continued).

	Reporting preference for doctor's gender		Reporting preference for doctor's ethnicity	
	Percent	χ^2 test	Percent	χ^2 test
Monthly income (£)				
None (N=35)	40.0%		77.1%	
£1 – 500 (N=296)	15.9%		41.9%	
£501 – 1000 (N=53)	1.9%	$\chi^2(3)=27.22$	18.9%	$\chi^2(3)=32.87$
£1001 – 1500 (N=19)	0%	p<.0005	21.1%	p<.0005
Educational level				
None (N=76)	48.7%		96.1%	
< Five years (N=69)	15.9%		62.3%	
Five years + (N=222)	5.0%	$\chi^2(3)=84.68$	17.1%	$\chi^2(3)=162.22$
Higher education (N=36)	8.3%	p<.0005	30.6%	p<.0005
Ethnicity of a doctor treating diabetes				
British	8.1%		9.5%	
Indian	67.7%		44.2%	
Pakistani	22.6%	$\chi^2(4)=19.405$	86.4%	$\chi^2(4)=115.86$
Bangladeshi	1.6%	p=.001	100%	p<.0005
Not known	0%		100%	

Not surprisingly perhaps, female participants were more likely than males to report having a preference for a doctor's gender, and a similar difference was found for reports of having a preference for a doctor's ethnicity (Table 4.33). As can be seen from Table 4.33, preferences of both kinds were greater in participants born in Asian countries, and those with lower level of income, lower levels of education and reported having an Asian doctor to treat their diabetes. Christian participants were very unlikely to express either kind of preference while followers of Islam, Hinduism and Sikhism very likely to. Older people were more likely to have a preference for a doctor's ethnicity than younger people, but the age effect was not significant for preference for a doctor's gender. Noticeably, the patient's preference for a doctor's ethnicity, especially for the one born in an Asian country, was met ($\chi^2(4)$ = 128.127, p<.0005). The majority of Asian-born diabetic patients reported consulting an Asian doctor (60 % consulted an Indian doctor and 30.6% consulted a Pakistani doctor). It is not known if a preference for a doctor's gender is met or not, participants were not asked to describe the gender of a doctor who they regularly consult for their diabetes.

While the single factor analyses presented in Table 4.33 are useful descriptively, more insight may be gained by examining the predictive value of the independent variables in combination. Therefore logistic regression analyses were carried out on preferences for doctor's gender (Table 4.33a) and ethnicity (Table 4.34). Not surprisingly, gender was a significant predictor of a preference for a doctor's gender with an estimated odds ratio of 2.76 for females being more likely than males to express a preference. Country of birth was also significant, with an estimated odds ratio of 0.23 for UK born participants being less likely to report of preference.

Table 4.33a: Logistic regression analysis of predictors of preference for a doctor's gender

Factor	Wald χ^2	df	p-value
Gender	9.680	1	.002
Country of birth	10.559	1	.001
Age group	3.803	4	.433
Monthly income	3.145	3	.370
Educational level	2.934	3	.402
Reported ethnicity of doctor who treated diabetes	3.224	4	.521

Model Summary: Cox & Snell R^2 = .24; Nagelkerke R^2 = .40.

For reporting a preference for a doctor's ethnicity (Table 4.34), gender, monthly income and ethnicity of doctor were not significant predictors, but country of birth was a powerful predictor with an odds ratio of 0.012 for UK born participants being less likely to report of preference. Age group and educational level were also significant predictors. The linear trend was significant for educational level (Wald $\chi^2(1) = 11.17$, $p = .001$, odds ratio = .058). None of the polynomial contrasts among the age groups were significant, so the fairly weak effect of age is difficult to interpret.

Table 4.34: Logistic regression analysis of predictors of preference for Doctor's ethnicity

Factor	Wald χ^2	df	p-value
Gender	1.691	1	.193
Country of birth	50.177	1	<.0005
Age group	12.544	4	.014
Monthly income	1.479	3	.687
Educational level	9.150	3	.028
Reported ethnicity of doctor who treated diabetes	8.523	4	.074

Model Summary: Cox & Snell $R^2 = .64$; Nagelkerke $R^2 = .86$.

(C) Self-reliance

In order to maintain health and avoid early complications a diabetic person needs to control their glycaemic level within the acceptable range. Diabetics are asked to make adjustments to their lives. Adjustments include eating healthily with an adequate diet, consuming medication prescribed precisely to the recommended dose and timing, monitoring blood glucose regularly and attending routine check-ups. These alterations to lifestyle depend mostly on self-reliance (except when a diabetic is mentally or physically disabled, when some alternative assistance must be organised). Some questions in the interview investigated issues of self- reliance, especially insulin self-injection and attendance at diabetes clinics.

Insulin injection

Seventy-nine participants (19.6%) reported that they were insulin users (see Table 4.18). Thirty eight percent of insulin users ($n = 30/79$) reported that they had used insulin injections of less than one year. Self-injection was reported by 70 insulin users (88.6%) so a minority were not doing themselves. The 9 who required assistance reported asking children (8 participants) and a relative (1 participant) to help them when an insulin injection was required. Three were males born in the UK, 3 were males born in an Asian country, and three were females born in an Asian country. They tended to be older (mean = 60.2 years) than the insulin users who self-injected (mean = 43.8 years), and the difference was statistically significant ($t(77) = 3.36$, $p = .001$; corrected for unequal variances, $p = .010$).

This dependence on other people may be linked with the subsequent psychological condition e.g. attitude to diabetes and lack of self-confidence (Part 4). Most importantly, more serious diabetic conditions or even early death may arise if injections were missed. Each person who required help with insulin injection had one or more diabetic complications, and they were significantly more likely to have cataracts or skin problems compared to those who self injected (Table 4.32). It is possible that these differences are primarily due to the greater age of those needing assistance. There was no significant difference in the number of categories of complications reported by those requiring assistance (mean = 5.1 categories), and those not (4.7 categories).

Table 4.35: Association between requiring assistance for insulin injections and occurrence of complications among participants taking insulin (N=79).

Complication	Self-injection	Requires assistance	Total	Fisher's Exact Test
Blurred vision				
Yes	63	9	72	p =1.000
No	7	0	7	
Cataract				
Yes	17	6	23	p = .016
No	53	3	56	
Blindness				
Yes	0	1	1	p = .114
No	70	8	78	
Kidney problem				
Yes	27	3	30	p =1.000
No	43	6	49	
Nerve problem				
Yes	61	7	68	p = .605
No	9	2	11	
Skin problem				
Yes	55	4	59	p = .041
No	15	5	20	
Heart disease				
Yes	47	7	54	p =.711
No	23	2	25	
Feet problem				
Yes	61	9	70	p = .387
No	9	0	9	

Attending diabetes appointments

The mean reported travelling time to the diabetes clinic was 13.3 minutes and 51% of participants used their own transport - a car (Table 4.36). Seventy three percent (n = 294) were independent and going to each appointment on their own, while the remainder (n = 109) reported depending on partners, children or other relatives to take them to appointments (Table 4.37). Seventy-four participants reported involving children in this role.

Table 4.36: Type of transport used to clinic appointment

Type of transportation	Frequency	Percent
Own transport	204	50.6%
Public transport	61	15.1%
Other (e.g. taxi)	138	34.2%
Total	403	100.0%

Table 4.37: Diabetes appointment companions

Companions	Frequency	Percent
Partners	23	5.7
Children	74	18.4
Grandchildren/relatives	8	2.0
A friend	2	.5
On my own	296	73.4
Total	403	100.0

Table 4.38: Logistic regression analysis on demographic variables and involving a companion in attending clinic appointments

	Wald χ^2	df	p-value
Gender	15.323	1	<.0005
Country of birth	34.427	1	<.0005
Age group	12.256	4	.016
Monthly income	3.167	3	.367
Education	20.106	3	<.0005

Model Summery: Cox & Snell R^2 = .43; Nagellkerke R^2 = .63.

Demographic variables were entered together into a logistic regression analysis, gender, country of birth, age group and educational level were found to be significant (Table 4.38). The odds that a female would involve a companion was 3.20 times as high as for a male. The odds that a UK-born participant would involve a companion was 0.13 times less than the odds for one born in an Asian country. For level of education, the linear trend component was significant ($\chi^2(1)$ = 11.43, p=.001), and for age group the quadratic trend component was significant ($\chi^2(1)$ = 8.08, p=.004).

Two health variables were found to be significantly associated with involving a companion in attending diabetes clinic appointments: preference for a doctor's gender and preference for doctor's ethnicity (Table 4.39). The odds that a participant reported having a preference for a doctor's gender was .13 times as high as for a participant reported having no preference. The odds that a participant reported having a preference for a doctor's ethnicity was .43 times as high as for a participant reported having no preference.

Table 4.39: Logistic regression analysis on health variables and involving a companion in attending clinic appointments.

	Wald χ^2	df	p-value
Preference for a doctor's gender	22.359	1	<.0005
Preference for a doctor's ethnicity	70.676	1	<.0005
Smoking	.969	1	.325
Using Betel-nuts	.396	1	.529
Treatment type	2.295	2	.153
Family history of diabetes	3.777	1	.052
BMI	1.135	1	.287
Complications	.023	1	.880

Model Summary: Cox & Snell R^2 = .403; Nagelkerke R^2 = .585.

When the significant predictors in Table 4.38 and Table 4.39 were entered into a logistic regression analysis, monthly income become non-significant (Table 4.40), suggesting that a participant reported involving a companion in attending diabetes clinic appointments was more likely to be female, old, had low educational background, reported having a preference for a doctor's gender and a preference for a doctor's ethnicity.

Table 4.40: Logistic regress predicting whether on not a participant reported involving a companion in attending clinic appointments

	Wald χ^2	df	p-value
Preference for a doctor's gender	6.953	1	.008
Preference for a doctor's ethnicity	38.049	1	<.0005
Gender	11.333	1	.001
Monthly income	2.870	3	.412
Age group	14.079	4	.007
Education	10.348	3	.016

Model Summary: Cox & Snell R^2 = .469; Nagelkerke R^2 = .680.

Part 3. Psychological adjustment to diabetes

Sixteen different attitudinal statements (PAD16) relating to a patient's perception of diabetes were developed for this study (Chapter 2). Statements (Appendix I) were designed to reflect the following five psychological concepts.

1. **"Coping"** items 12, 13 assess the individual's perception of his/her ability to cope with stress and his/her competence to deal with diabetes.
2. **"Feeling convicted"** items 2, 3, 7, 15, 16 comprise a bipolar dimension very similar to a factor identified in patients with chronic pain, called "disease conviction" (Bradley, 1996). People who score negatively on this factor reject the notion that they have a chronic illness and find the whole routine of daily management abnormal and distasteful. They also anticipate that diabetes will be cured in the near future. Positive scores indicate acceptance of the daily regimen as a normal part of life and reconciliation with the belief that diabetes will never go away.
3. **"Uncertain feelings"** living with diabetes involves many uncertainties about the development of the condition and ambiguities about management. The person who agrees strongly with these items 1 and 9 shows a marked lack of flexibility and a resistance to new input. Conversely, the positive-scoring person tolerates the ambiguities and associated anxiety.
4. **"Guilt"** items 4, 5, 8 measure guilt and embarrassment associated with diabetes.
5. **"Diabetes stress"** items 6, 10, 11, 14 reflect the degree to which respondents feel that diabetes creates stress and feelings of disintegration.

The items were scored on five-point Likert scale ranging from "strongly disagree" (scored 1) through to "strongly agree" (scored 5), with all items except 1, 9 and 12 being reverse-scored. Raw scores (reversed as required) on the sixteen items are summed to produce a total score that can range from 16 to 80. Participants with high scores on the PAD16 would be poorly adjusted to their diabetes, while those scoring low would be accepting of their diabetes, comfortable with public awareness of their diabetes, be calm, have a sense of self-control and feel well adjusted to their diabetes. Cronbach's alpha coefficient for the overall scores was 0.989.

Analysis of Variance was used to explore the relationship between five demographic variables and PAD16 scores. This test can identify whether there is a difference between the groups in each independent variable, partialling out any effects of the other dependent variables (analogous to regression analysis). To avoid problems with small cell sizes, a main-effects-only model was used. Since regression analyses are conventionally (but not necessarily) run without interactions (Cohen & Cohen, 1983), this is a further parallel between this ANOVA and regression (including logistic regression as used here). In a conventional ANOVA, the stability of the analysis depends on the number of observations in each cell, but in a main effects only model (without interactions), stability depends on the number of observations at each level of the independent variables considered separately. Similarly, power is not primarily effected by cell sizes.

Significant effects were found for income level, country of birth and age group and income level. The effects of gender and educational level were not significant (Table 4.41).

Table 4.41: Analysis of Variance on relationships between demographic variables and PAD16 scores

Source	df	Mean Square	F	p-value
Gender	1	441.818	1.258	.263
Educational level	3	63.607	.181	.909
Monthly income	3	2114.096	6.020	.001
Country of birth (UK/Asian)	1	8134.064	23.161	<.0005
Age group	4	1725.122	4.912	.001
Error	390	351.204		

Model summary: R^2 = .167, adjusted R^2 = .141.

Estimated means are shown in Table 4.42. PAD16 scores were much higher among the Asian-born participants than among those born in the UK. Among the income levels, scores were higher in the £1-£500 band with the other bands being very similar to one another. Scores generally decreased with age, a trend that was confirmed by a significant linear trend (p = .001), and none of the other polynomial contrasts were significant. Thus, from this analysis, it appears that adjustment to diabetes was worst in participants born in an Asian country, participants who had an income but at a low level, the majority of whom were pensioners (Table 4.15).

Table 4.42: Estimated means from the analysis of variance on effects of demographic variables on PAD16 scores

	Mean	SE	95% CI	
Gender				
Male (N=221)	52.4	2.06	40.3	56.4
Female (N=182)	54.9	2.05	50.9	58.9
Educational background				
None (N=76)	53.8	3.08	47.9	59.9
< Five years (N=69)	52.5	2.77	47.1	57.9
Five years + (N=222)	54.6	2.02	50.6	58.5
Higher education (N=36)	53.7	3.33	47.1	60.3

Table 4.42: Estimated means from the analysis of variance on effects of demographic variables on PAD16 scores (continued)

	Mean	SE	95% CI	
Monthly income (£)				
None (N=35)	52.5	3.51	45.6	59.4
£1 – 500 (N=296)	60.8	1.63	57.6	64.1
£501 – 1000 (N=53)	50.7	2.81	45.2	56.2
£1001 – 1500 (N=19)	50.5	4.48	41.7	59.3
Country of birth				
Asian-born (N=193)	59.5	2.00	55.6	63.4
UK-born (N=210)	47.8	2.19	43.5	52.1
Age				
≤35 (N=23)	64.64	4.10	56.6	72.7
36 to 45 (N=37)	56.8	3.27	50.4	63.3
46 to 55 (N=79)	47.7	2.46	42.8	52.5
56 to 65 (N=105)	51.1	2.40	46.4	55.8
66+ (N=159)	48.1	2.24	43.7	52.5

A further analysis of variance was carried out to assess the relationship between health and treatment factors and PAD16 scores. The factors were: smoking (yes/no); betel use (yes/no); treatment type (tablets, insulin or both); family history of diabetes (yes/no); preference for a doctor's gender (yes/no); preference for a doctor's ethnicity (yes/no); involving a companion for clinic appointments (yes/no); complications (yes/no). In addition, BMI was entered as a covariate. The findings from this Analysis of Variance are displayed in Table 4.43.

Table 4.43: Analysis of Variance on relationships between health and treatment variables and PAD16 scores.

Source	df	Mean Square	F	p-value
Smoking	1	46.232	.457	.499
Using Betel	1	788.943	7.800	.005
Treatment type	2	2483.969	24.559	<.0005
Family history of diabetes	1	1591.378	15.734	<.0005
Pref for doctor's gender	1	420.737	4.160	.042
Pref for doctor's ethnicity	1	49.464	.489	.485
Involve companion in appointments	1	13.838	.137	.712
Complications	1	83747.209	828.021	<.0005
BMI	1	655.911	6.485	.011
Error	392	101.141		

Model summary: $R^2 = .759$, adjusted $R^2 = .753$

The R^2 statistics show that this set of health-related variables explains far more of the variance in the PAD16 scores than the set of demographic variables used in the previous analysis of variance. Estimated means are shown in Table 4.44. They show that lower scores (poorer adjustment) were associated with using betel, treatment involving insulin, a family history of diabetes, a preference for a doctor's gender, and having complications. Higher BMI scores were also associated with higher PAD16 scores (regression coefficient = .43, SE = .17).

Table 4.44: Estimated means from the analysis of variance on effects of health variables on PAD16 scores

Factor		Mean	SE	95%	CI
Smoking	yes (N=24)	53.5	2.44	48.6	58.3
	no (N=379)	54.9	1.49	52.0	57.8
Using Betel	yes (N=28)	57.2	2.46	52.3	62.0
	no (N=375)	51.2	1.46	48.3	54.1
Treatment type	tablets (N=324)	48.18	1.50	45.2	51.1
	insulin (N=49)	59.0	2.14	54.8	63.2
	both (N=30)	55.4	2.47	50.5	60.2
Family history diabetes	yes (N=150)	52.0	1.78	48.5	55.5
	no (N=253)	56.4	1.83	52.8	60.0
Pref doctor's gender	yes (N=62)	55.8	2.10	51.7	60.0
	no (N=341)	52.5	1.69	49.2	55.8
Pref doctor's ethnicity	yes (N=165)	54.7	1.76	51.2	58.1
	no (N=238)	53.7	1.96	49.8	57.5
Involve companion	yes (N=109)	54.5	1.99	50.6	58.4
	no (N=294)	53.9	1.78	50.4	57.4
Complications	yes (N=292)	71.1	1.62	68.6	74.9
	yes (N=111)	24	36.6	2.00	32.7

When the demographic factors significant in Table 4.41, and the health and treatment factors significant in Table 4.43 were combined into a single main-effects only Analysis of Variance, the only change in the pattern of significant effects was that age group became not significant [$F(4, 387) = .37$, $p = .830$]. This marked change in the effect of age was clear whether it was entered into the analysis as a set of age groups or as a single continuous variable. Thus the effect of age was mediated by some combination of the various health and treatment variables. It turned out that the addition of treatment type to the model described in Table 4.43 was sufficient to markedly reduce the age effect, which is understandable because age group and treatment type were strongly associated ($\chi^2(8) = 173$, $p<.0005$, Cramer's $V = .46$).

In summary, the analysis of the PAD16 scores suggests that poorer adjustment is associated with using betel, treatment involving insulin, a family history of diabetes, having a preference for a doctor's gender, having complications and having higher BMI scores. These effects are independent of having a low income and being born in an Asian country rather than the UK, factors, which are also associated with relatively poor adjustment to diabetes. Age and gender did not predict adjustment independently of these other factors.

Part 4. Treatment satisfaction/dissatisfaction

Feelings of dissatisfaction, mostly with patient-doctor relationships and treatment (medications), are thought to be one of the most influential factors over the decision to use alternative medicine among British patients (Sharma, 1992) and communication difficulties among Asian patients (McAvoy & Donaldson, 1990).

To measure patient satisfaction, sixteen questions were devised for this study. The questions covered issues including satisfaction and dissatisfaction with: treatment;

understanding of diabetes; the health care team; adequacy of care, medical advice and information; communication; and health care facilities (Appendix I). These questions were also scored on a five-point scale ranging from 0 (very dissatisfied) through to 4 (very satisfied). Items to be summed were 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 16. Thus overall scores could range from 0 (very dissatisfied) to 52 (very satisfied). The overall score from these items will be termed *treatment satisfaction.*

Treatment satisfaction scores were inversely related to PAD16 scores ($r = -.474$, $p<.0005$) indicating that participants who were less well adjusted to their diabetes were more dissatisfied with their treatment. It is unlikely that the PAD16 and treatment satisfaction scores were measuring the same underlying variable since, with just two exceptions, corrected item-total correlations *within* each of the scales (range .42 to .97) were larger in absolute terms than correlations *between* the scales (correlations between PAD16 items and the overall score for treatment satisfaction and between treatment satisfaction items and the overall score for the PAD16, range -.29 to -.53).

The remaining three items were treated individually. Item 4 was a self rating of the individual's understanding of how the prescribed treatment works for his/her diabetes, on a scale ranging from 0 (not at all) to 10 (completely). Items 14 and 15 evaluate the individuals' vulnerability to communication barriers with the health care team on a scale ranging from 0 (very valuable) to 4 (not very valuable) with an additional response option to indicate that a participant used English as their native language.

Treatment satisfaction

A main-effects-only Analysis of Variance was used to explore the relationship between five demographic variables and treatment satisfaction scores. Significant effects were found for educational level, country of birth and age group, while gender and income level were not significant (Table 4.45).

Table 4.45: Analysis of Variance on relationships between demographic variables and treatment satisfaction scores.

Source	df	Mean Square	F	p-value
Gender	1	7.430	.119	.731
Educational level	3	240.791	3.844	.010
Monthly income	3	43.844	.700	.553
Country of birth (UK/Asian)	1	2471.559	39.451	<.0005
Age group	4	801.550	12.794	<.0005
Error	390	62.667		

Model summary: $R^2 = .279$; adjusted $R^2 = .256$

Broadly, satisfaction scores tended to increase with age (Table 4.46), and there was a significant linear trend across the age groups ($p<.0005$). Satisfaction was lowest in participants with higher education, presumably because they were better placed to evaluate their situation, but it was also low among those with no education. On average, UK-born participants were more satisfied than those born in an Asian country.

Table 4.46: Estimated means from the analysis of variance on effects of demographic variables on Treatment Satisfaction scores

	Mean	SE	95% CI	
Gender				
Male (N=221)	40.72	0.87	39.01	42.4
Female (N=182)	40.4	0.86	38.7	42.1
Educational background				
None (N=76)	39.7	1.30	37.1	42.2
< Five years (N=69)	42.9	1.17	40.4	45.1
Five years + (N=222)	41.8	0.85	40.1	43.5
Higher education (N=36)	38.0	1.41	35.1	40.8
Monthly income (£)				
None (N=35)	40.9	1.48	37.9	43.8
£1 – 500 (N=296)	39.5	0.69	38.1	40.8
£501 – 1000 (N=53)	40.8	1.18	38.4	43.1
£1001 – 1500 (N=19)	41.1	1.89	37.4	44.9
Country of birth				
Asian-born (N=193)	37.3	0.84	35.7	39.0
UK-born (N=210)	43.8	0.92	41.8	45.6
Age				
≤35 (N=23)	32.8	1.73	29.4	36.2
36 to 45 (N=37)	38.9	1.38	36.1	41.6
46 to 55 (N=79)	43.4	1.04	41.4	45.4
56 to 65 (N=105)	42.8	1.01	40.8	44.8
66+ (N=159)	45.0	0.96	43.1	46.9

A main-effects-only Analysis of variance was also used to explore the relationship between health and treatment variables and treatment satisfaction scores. Factors were: smoking; the use of betel; treatment type; family history of diabetes; preference for doctor's gender; preference for doctor's ethnicity; involving a companion in appointments, and the presence of complications. BMI measurements were entered as a covariate. Significant effects were found for treatment type, preference for a doctor's gender, preference for a doctor's ethnicity, involving a companion in appointments, and having complications (Table 4.47). Noticeably, the biological risk factors of smoking, using betel, a family history of diabetes and BMI were not significant predictors of treatment satisfaction.

Table 4.47: Analysis of Variance on relationships between health/treatment variables and treatment satisfaction scores.

Source	df	Mean Square	F	p-value
Smoking	1	40.162	1.150	.284
Using betel	1	41.181	1.179	.278
Treatment type	2	5847.257	167.364	<.0005
Family history of diabetes	1	32.939	.943	.332
Pref for doctor's gender	1	138.466	3.963	.047
Pref for doctor's ethnicity	1	558.598	15.989	<.0005
Involve companion in appointments	1	240.742	6.891	.009
Complications	1	868.237	24.851	<.0005
BMI	1	14.289	.409	.523
Error	392	34.937		

Model summary: $R^2 = .596$; adjusted $R^2 = .585$

As can be seen from Table 4.48, participants who were receiving insulin, either with or without tablets, were less satisfied than those whose treatment did not involve insulin. Those who expressed no preference for a doctor's gender or ethnicity were more satisfied than those who did express a preference. Those who involved a companion in clinic appointments were less satisfied than those who did not, and those who had complications were less satisfied than those who did not.

Table 4.48: Estimated means from Analysis of Variance on relationships between health and treatment variables and treatment satisfaction scores.

Factor		Mean	SE	95%	CI
Smoking	yes (N=24)	35.5	1.44	30.7	36.3
	no (N=379)	34.9	0.88	33.1	36.6
Using Betel	yes (N=28)	33.5	1.45	30.7	36.3
	no (N=375)	34.9	0.86	33.2	36.6
Treatment type: diet +	tablets (N=324)	44.0	0.89	42.3	45.7
diet +	insulin (N=49)	29.2	1.26	26.8	31.7
diet +	both (N=30)	29.3	1.45	26.5	32.2
Family history diabetes	yes (N=150)	34.5	1.05	32.4	36.56
	no (N=253)	33.9	1.07	31.8	36.0
Pref doctor's gender	yes (N=62)	33.2	1.23	30.8	35.7
	no (N=341)	35.1	0.99	33.2	37.1
Pref doctor's ethnicity	yes (N=165)	32.5	1.03	30.5	34.5
	no (N=238)	35.9	1.15	33.6	38.1
Involve companion	yes (N=109)	33.0	1.17	30.7	35.3
	no (N=294)	35.4	1.04	33.3	37.4
Complications	yes (N=292)	32.4	0.95	30.5	34.3
	no (N=111)	36.0	1.78	33.7	38.3

An Analysis of variance on treatment satisfaction using just those health variables that were significant in the analysis of Table 4.45, but now including also the demographic variables significant in Table 4.47, found that preference for a doctor's gender, preference for a doctor's ethnicity, and involving a companion in clinic appointments, were now not significant (Table 4.49). This change in the pattern of significant results did not require inclusion of the age group factor. Since the demographic variables seem more "basic" than the health variables, which are psychological in nature, it seems probable that the health variables mediate the effects of country of birth and educational level on treatment satisfaction.

Table 4.49: Analysis of variance on treatment satisfaction scores, with independent variables found to be significant in preceding analyses.

Source	df	Mean Square	F	p
Educational level	3	135.573	4.282	.004
Country of birth (UK/Asian)	1	833.714	26.334	<.0005
Age group	4	70.742	2.235	.035
Treatment type	2	4537.467	143.323	<.0005
Pref for doctor's gender	1	100.462	3.173	.076
Pref for doctor's ethnicity	1	36.840	1.163	.281
Involve companion in appointments	1	76.015	2.401	.122
Complications	1	904.017	28.555	<.0005
Error	388	31.659		

Model summary: $R^2 = .637$; adjusted $R^2 = .624$.

Self-rating of the understanding of how the prescribed treatment works

Item 4 was a self rating of the individual's understanding of how the prescribed treatment works for his/her diabetes, on a scale ranging from 0 (not at all) to 10 (completely). A main effects Analysis of Variance examined how the scores were related to the demographic variables of gender, educational level, monthly income, country of birth and age group (Table 4.50). Significant effects were found for country of birth and age group. UK-born participants indicating a higher level of understanding (mean 8.9, SE = .132) than those born in a Asian country (mean = 7.8, SE = .121), and a significant linear polynomial trend (p = .003) indicated that understanding tended to decline with age from a mean of 8.9 among youngest group, to a mean of 8.0 among the 66+ year olds.

Table 4.50: Analysis of variance of relationships between demographic variables and understanding of prescribed treatment.

Source	df	Mean Square	F	p-value
Gender	1	.221	.173	.677
Educational level	3	1.900	1.490	.217
Monthly income	3	3.063	2.403	.067
Country of birth (UK/Asian)	1	65.762	51.586	<.0005
Age group	4	4.646	3.645	.006
Error	390	1.275		

Model summary: $R^2 = .273$, adjusted $R^2 = .251$

A similar Analysis of Variance was used to examine the influence of health and treatment factors (Table 4.51). Participants who used betel had lower ratings of understanding (mean = 7.5, SE = .27) than those who did not (mean = 8.0, SE = .16). Those with a family history of diabetes had higher ratings (mean = 8.0, SE = .20) than those who did not (mean = 6.6, SE = .20). Those who had a preference for a doctor's ethnicity had lower ratings of understanding (mean = 7.4, SE = .19) than those who did not (mean = 8.1, SE = .22), and those who had complications had lower ratings (mean = 7.4, SE = .17) than those who had no complications (mean = 8.1, SE = .22).

Table 4.51: Analysis of Variance on relationships between health and treatment variables and understanding of prescribed treatment.

Source	df	Mean Square	F	p-value
Smoking	1	1.953	1.601	.207
Using betel	1	6.215	5.095	.025
Treatment type	2	3.280	2.689	.069
Family history of diabetes	1	12.240	10.034	.002
Pref for doctor's gender	1	3.965	3.250	.072
Pref for doctor's ethnicity	1	23.055	18.899	<.0005
Involve companion in appointments	1	1.679	1.377	.241
Complications	1	36.630	30.028	<.0005
BMI	1	9.986E-03	.008	.928
Error	392	1.220		

Model summary: R^2 = .301, adjusted R^2 = .283

The Analysis of Variance described in Table 4.52 was run to check whether any of the significant effects of health and treatment variables might be due to an association with demographic variables that had been found to be significant.

Table 4.52: Analysis of variance on understanding of treatment ratings with independent variables found to be significant in preceding analyses.

Source	df	Mean Square	F	p-value
Country of birth (UK/Asian)	1	25.540	22.196	<.0005
Age group	4	4.642	4.034	.003
Using betel	1	2.157	1.875	.172
Family history of diabetes	1	3.293	2.862	.092
Pref for doctor's ethnicity	1	1.010	0.017	.897
Complications	1	51.866	45.076	<.0005
Error	393	1.151		

Model summary: $R^2 = .339$, adjusted $R^2 = .324$.

The inclusion of the demographic variables age and country of birth reduces the effect of betel usage, preference for a doctor's ethnicity and having a family history of diabetes to a point where they are no longer significant. In fact, the addition of country of birth is sufficient to account for the change in the effect of preference for a doctor's ethnicity, which thus might simply be an indicator of a country of birth effect. The addition of age group is sufficient to account for the change in the effect of family history of diabetes, which is consistent with the finding that participants who report a family history of diabetes tend to be younger (mean age = 55.1 years) than those who do not (mean age, 61.4 years, $t(401) = 4.94, p<.0005$). It seems most likely that this is because older participants tended to be less well informed about this aspect of their family's history. The addition of either country of birth or age group was sufficient to reduce the effect of betel usage to a non-significant level. The use of betel-nuts was confined to Asian-born participants, and is most common in the middle of the age range, 46 –65 years. The difference in ratings of understanding between participants with and without complications remains significant, indicating that it is independent of the demographic variables examined.

Items 14 and 15: The value of communication in the participants' own language

Communication is the process whereby individuals exchange or share information, for example by speaking or writing. Good communication is central to clinical competence (McAvoy and Sayeed, 1990). Studies considered the communication difficulties experiencing by this group as a contributor to poor knowledge about the nature of diabetes (Simmons et al., 1991; Hawthorne, 1990), non-attendance rate at a diabetic clinic (Hawthorne, 1990), and poor adherence (Gillam and Levenson, 1999) when compared with the UK-born populations. In 1977, a National study (Smith, 1977) showed that 77 percent of Pakistani women and 60 percent of Indian women spoke English only slightly or not at all. Age seems to be more closely related to fluency in English than length of domicile in Britain. Another survey of Britain's black by Policy Studies Institute (Brown, 1984) discovered that within the adult Asian population 60 percent of Bangladeshis and 48 percent of Pakistanis spoke little or no English, compared with only 28 percent of Indians and 18 percent of 'African Asians'. For the all age-group men are on the whole more fluent than women. A large percentage of first-generation Asians, especially females, could not read, speak or understand English

(Levy et al., 1986; Mello, 1992; Irving, 1994), so their relatives are often used as interpreters and in many cases children will be involved as they have been taught English at school (Young, 1997). It is not known if communication difficulties influence the reasons why Asian people, in general, may turn to the use of unconventional therapeutic methods, for example usage of medicinal plants. In order to establish such communication difficulties, participants who were not born in the UK were asked to rate (1) how valuable would it be to have health information written in their own language and (2) how valuable it would be to have health care staff speaking in their own language? The ratings were on a five-point scale from very valuable (0) to not valuable (4). Responses to the two questions are summarized in Table 4.53. Only two participants did not give identical responses to the questions about written and spoken language. All the UK-born participants reported English as their native language.

Table 4.53: Distribution of responses to questions about value of communication in the participants' (not born in the UK) own language

Value of having health information written in own language	N
Rating: very valuable or valuable	149
Rating: not very valuable, not valuable or undecided	36
Value of having staff speaking in your own language	N
Rating: very valuable or valuable	151
Rating: not very valuable, not valuable or undecided	34

Of the 185 participants who provided ratings, 151 (82%) responded with very valuable or valuable on one or other of the two ratings. Thus it is very clear that there was a very high percentage wanting health information written in Asian languages and a health care professional speaking the Asian languages. Logistic regression analyses were used to examine features, which distinguished these participants from the remaining 34. An analysis with demographic variables as predictors (gender, educational level, monthly income with age as a continuous variable) revealed only that the likelihood of a valuable or very valuable rating increased steadily with age (Table 4.54).

Table 4.54: Logistic regression analysis using demographic variables to predict which Asian-born participants would value communication in their own language.

	Wald χ^2	df	p-value
Gender	.176	1	.674
Educational level	.896	3	.826
Monthly income	2.191	3	.534
Age	8.419	1	.004

Model summary: Cox & Snell R^2 = .257; Nagelkerke R^2 = .418

A similar logistic regression investigated the role of health and treatment variables in predicting which participants would value communication in their own language (Table 4.55). Users who had a preference for a doctor's ethnicity were more likely to value communication in their own language (odds ratio = 50.0), as were those who involved a companion in their clinic appointments (odds ratio = 29.4), and those who had complications (odds ratio = 14.3). The type of treatment factor was also highly significant. Analysis of contrasts showed that those on a diet + insulin regime were significantly less likely to value communication in their own language than either those on a diet + tablets regime (($\chi 2(1) = 17.72$, $p<.0005$, odds ratio = .003) or those on a diet + tablets + insulin regime ($\chi 2(1) = 9.98$, $p = .002$, odds ratio = .008). Fisher exact tests on these two contrasts were also significant so, although based on small numbers, this finding seems to be robust (Table 4.56). However, it is difficult to interpret, as it does not map onto whether or not the participants used insulin, which might be expected to be associated with increased anxiety.

Table 4.55: Logistic regression analysis using health and variables to predict which Asian-born participants would value communication in their own language.

	Wald χ^2	df	p
Smoking	.001	1	.979
Using betel	.081	1	.776
Treatment type	17.967	2	<.0005
Family history of diabetes	.058	1	.810
Pref for doctor's gender	.487	1	.485
Pref for doctor's ethnicity	15.731	1	<.0005
Involve companion in appointments	7.241	1	.007
Complications	6.558	1	.010
BMI	.202	1	.653

Model summary: Cox & Snell $R^2 = .48$; Nagelkerke $R^2 = .78$.

Table 4.56: Percentage of participants would value communication in their own language by treatment type

Treatment type	Percent
Diet + tablets (N=148)	89.2%
Diet + insulin (N=24)	37.5%
Diet + tablets + insulin (N=13)	76.9%

When significant demographic variables in Table 4.54 and significant health variables in Table 4.55 were entered into a logistic regression analysis, age became non-significant (Table 4.57). This suggested that a participant who reported having a preference for a doctor's ethnicity, used diet + tablets to treat diabetes, reported involving a companion when attend diabetes clinic appointments, and reported having complications, would value communication in his/her own language.

Table 4.57: Logistic regressing analysis using combined significant demographic and health variables to predict which participants would value communication in their own language.

	Wald χ^2	df	p-value
Age	1.160	1	.281
Treatment type	20.108	2	<.0005
Pref for doctor's ethnicity	17.397	1	<.0005
Involve companion in appointments	8.645	1	.003
Complications	9.876	1	.002

Model Summary: Cox & Snell R^2 = .468; Nagelkerke R^2 = .761.

Part 5. Self-care behaviour

This part contains 9 questions concerning an individual's self-care behaviour. The scoring and analysis of self-care behaviour was carried out in four separate sections as follows.

Section 1: Adherence. Scores were summed across 5 items concerning adherence to diet, exercises and blood testing. This score could range from 5 to 40.

Section 2: Acceptance of medication. Items 6, 7 and 8 respectively asked about acceptance of three types of medication: diabetes tablets, blood pressure tablets and insulin injections. Each item had 3 sub-questions scored on a scale of 1 to 5. Thus, for each type of medication, acceptance scores could range from 3 to 15.

Section 3 Attending appointments. There was one item in this section, item 9. Scores could range from 0 to 4.

Section 1. Adherence to diet, exercise and blood tests

The mean score for adherence to diet, exercise and blood tests was 27.90, the median was 28, and range was 7 to 40.

A main effects Analysis of Variance examined the relationships between adherence scores and demographic variables (Table 4.58). Significant effects were found for country of birth and age. Means (Table 4.59) showed that participants born in the UK had higher adherence scores than those born in an Asian country. Mean adherence scores declined from the first to the fourth age band, and then flattened out, a pattern confirmed by significant linear and quadratic contrasts (p = .001 and p = .031).

Table 4.58: Analysis of Variance on relationships between adherence scores and demographic variables

Source	df	Mean Square	F	p-value
Gender	1	9.763	.377	.540
Educational level	3	40.217	1.553	.200
Monthly income	3	51.111	1.973	.117
Country of birth (UK/Asian)	1	825.574	31.817	<.0005
Age group	4	175.901	6.790	<.0005
Error	390	25.904		

Model summary: $R^2 = .272$; adjusted $R^2 = .250$.

Table 4.59: Means for significant effects of demographic variables on adherence scores

	Mean	SE	95%	CI
Country of birth				
Asian-born (N=193)	27.451	.544	26.382	28.519
UK-born (N=210)	31.182	.594	30.013	32.350
Age				
≤35 (N=23)	33.669	1.113	31.481	35.857
36 to 45 (N=37)	29.092	.888	27.346	30.837
46 to 55 (N=79)	27.803	.669	26.489	29.118
56 to 65 (N=105)	28.309	.651	27.029	29.588
66+ (N=159)	27.690	.607	26.496	28.884

Table 4.60 shows the results of a main effects Analysis of Variance examining relationships between adherence scores and health and treatment variables. Means for significant effects are shown in Table 4.61.

Table 4.60: Analysis of Variance examining relationships between adherence scores and health and treatment variables.

Source	df	Mean Square	F	p-value
Smoking	1	838.825	48.370	<.0005
Using betel	1	158.389	9.133	.003
Treatment type	2	1299.229	74.918	<.0005
Family history of diabetes	1	89.000	5.132	.024
Pref for doctor's gender	1	66.987	3.863	.050
Pref for doctor's ethnicity	1	562.806	32.453	<.0005
Involve companion in appointments	1	17.315	.998	.318
Complications	1	657.913	37.938	<.0005
BMI	1	36.028	2.077	.150
Error	392	17.342		

Model summary $R^2 = .510$; adjusted $R^2 = .498$

Table 4.61: Means for significant effects of health and treatment variables on adherence scores

		Mean	SE	95%	CI
Using Betel:	yes (N=28)	25.476	1.018	23.475	27.478
	no (N=375)	28.156	.605	26.966	29.347
Smoking:	Yes (N=24)	23.721	1.012	21.732	25.701
	No (N=379)	29.911	0.618	28.696	31.127
Treatment type: Diet +...	tablets (N=324)	22.315	.623	21.091	23.539
	insulin (N=49)	29.755	.884	28.017	31.494
	both (N=30)	28.379	1.023	26.368	30.390
Family history diabetes	yes (N=150)	26.299	.736	24.852	27.747
	no (N=253)	27.333	.756	25.847	28.819
Pref doctor's gender	yes (N=62)	27.483	.698	26.111	28.855
	no (N=341)	26.150	.867	24.444	27.855
Pref doctor's ethnicity	yes (N=165)	28.514	.811	26.920	30.108
	no (N=238)	25.118	.728	23.687	26.549
Complications	yes (N=292)	28.373	.829	26.742	30.004
	no (N=111)	25.260	.670	23.942	26.578

When the significant demographic variables and the significant health and treatment variables were entered together into an analysis of variance, the results were as in Table 60. Now, the effect of having a preference for a doctor's ethnicity became not significant. In fact, this effect could be abolished by including either age group or country of birth.

Thus, in this sample, having a preference for a doctor's gender was seems to be a proxy for these two demographic variables.

Table 4.62: Analysis of variance on adherence scores with demographic and health treatment factors that were significant in preceding analyses.

Source	df	Mean Square	F	p-value
Smoking	1	930.006	55.375	<.0005
Using betel	1	114.708	6.830	.009
Treatment type	2	964.242	57.413	<.0005
Family history of diabetes	1	91.722	5.461	.020
Pref for doctor's gender	1	94.272	5.613	.018
Pref for doctor's ethnicity	1	25.334	1.508	.220
Complications	1	704.482	41.947	<.0005
Country of birth	1	285.459	16.997	<.0005
Age group	4	10.374	.618	.650
Error	389	16.829		

Model summary: $R^2 = .529$, adjusted $R^2 = .513$.

Acceptance of medication: tablets and insulin

In addition to tablets and insulin prescribed for the control of diabetes, many participants were also taking tablets for the control of blood pressure (Table 4.63).

Table 4.63: Use of blood pressure tablets by treatment type.

	Blood pressure tablets				Total
	no		yes		
Diet + tablets	129	(39.8%)	195	(60.8%)	324
Diet + insulin	49	(100%)	-	-	49
Diet + tablets + insulin	9	(30%)	21	(70%)	30
Overall	187	(46.4%)	216	(53.6%)	403

Participants were asked questions about their acceptance of these three types of medication. The questions asked were: how often do you find taking the tablets (insulin injections) difficult; how much does it bother you taking these tablets (insulin injections); how often do you miss taking the tablets (insulin injections)? Each question was asked separately for each type of medication. Responses were on a five point scale: all of the time (1); most of the time (2); half of the time (3); some of the time (4); none of the time (5); and there was a *not applicable* option for those not taking the particular form of medication. For each kind of medication, ratings were summed across the three questions to give a score than could range from 3 to 15. Table 4.64 provides some descriptive statistics for the acceptance scores for the three types of medication. The range of scores is much narrower for both kinds of tablet than for insulin injections.

The scores for tablets clustered around the top of the possible range, indicating generally positive perceptions. The scores for insulin injections had more variability and were in the centre of the possible range.

Table 4.64: Descriptive statistics for perception/adherence scores relating to diabetes tablets, insulin injections and blood pressure tablets.

	Diabetes tablets	Insulin injections	Blood pressure tablets
N	354	79	216
Minimum	9	5	9
Maximum	15	13	15
Mean	13.9	8.5	13.9
SD	.82	2.46	.82
Correlation with dose	-.24 ($p<.0005$)	.53 ($p<.0005$)	-.12 ($p=.079$)

Table 4.64 also shows correlations between acceptance scores and dose rates (tablets per day or insulin injections per day). The correlations for tablets are both negative, indicting a relatively weak tendency for participants on lower doses to be more positive about taking these medications. In contrast, the correlation for insulin injections was positive, indicating a clear tendency for participants on higher doses to feel more positive about the injections, presumably because they habituated to the procedure (or conceivably because of a low survival rate among those severely diabetic patients who required frequent insulin injections to which they could not adapt). Among the 216

participants who were taking tablets for both blood pressure and diabetes, the correlations between perception and adherence scores for the two kinds of tablets was very strong ($r = .84$, $p<.0005$) suggesting that very similar processes were involved. Correlations between acceptance scores for insulin and tablets were much lower; diabetes tablets and insulin ($r = 31$, $p = .091$, $N = 30$; blood pressure tablets and insulin, $r = -.08$, $p = .72$, $N = 21$.

Given the marked similarity between acceptance scores for diabetes tablets and blood pressure tablets, analysis of acceptance scores for tablet medication will be confined to diabetes tablets. This analysis is based on a larger number of participants than would be possible for blood pressure tablets, and is closer to the focus of this thesis. Table 4.65 shows the results of a main-effects-only analysis of variance on relationships between demographic variables and acceptance scores for diabetes tablets. The youngest age group was not represented in this sub-sample. None of the effects were significant.

Table 4.65: Analysis of variance on relationships between demographic variables and acceptance scores for diabetes tablets.

Source	df	Mean Square	F	p.
Gender	1	.986	1.485	.224
Educational level	3	.749	1.128	.338
Monthly income	3	1.606	2.418	.066
Country of birth (UK/Asian)	1	.941	1.418	.235
Age group	4	.371	.559	.732
Error	340	.664		

Model summary: $R^2 = .054$; adjusted $R^2 = .018$

An analysis of variance on relationships between health/treatment variables and acceptance scores for diabetes tablets is shown in Table 4.66. Means are shown in Table 4.67. Participants with a family history of diabetes had significantly higher mean scores than those who did not, those who had a preference for a doctor's gender had lower scores than those who did not, and those with complications had lower scores than those who did not. Thus having a family history of diabetes, having no preference for a doctor's gender, and having no complications, are associated with more positive perceptions.

Table 4.66: Analysis of variance on relationships between health/treatment variables and perception/adherence scores for diabetes tablets.

Source	df	Mean Square	F	p-value
Smoking	1	1.766	3.009	.084
Using betel	1	.151	.256	.613
Treatment type	1	.822	1.400	.238
Family history of diabetes	1	8.938	15.227	<.0005
Pref for doctor's gender	1	4.561	7.770	.006
Pref for doctor's ethnicity	1	.828	1.411	.236
Involve companion in appointments	1	.0216	.037	.848
Complications	1	16.270	27.717	<.0005
BMI	1	1.602	2.729	.099
Error	344	.587		

Model summary: $R^2 = .154$; adjusted $R^2 = .132$

Table 4.67: Estimated means from analysis of variance on relationships between health/treatment variables and perception/adherence scores for diabetes tablets.

		Mean	SE	95%	CI
Smoking	yes (N=22)	13.664	.203	13.264	14.064
	no (N=332)	13.961	.128	13.709	14.213
Using Betel	yes (N=25)	13.768	.209	13.356	14.179
	no (N=329)	13.857	.122	13.617	14.096
Treatment type: diet +	tablets (N=324)	13.723	.125	13.477	13.968
diet +	tablets+insulin(N=30)	13.902	.198	13.513	14.291
Family history diabetes	yes (N=117)	13.987	.153	13.686	14.288
	no (N=237)	13.638	.154	13.335	13.941
Pref doctor's gender	yes (N=56)	13.630	.144	13.711	14.279
	no (N=298)	13.995	.176	13.284	13.975
Pref doctor's ethnicity	yes (N=62)	13.885	.170	13.405	14.074
	no (N=341)	13.740	.147	13.596	14.174
Involve companion in appointments	yes (N=91)	13.800	.146	13.537	14.113
	no (N=263)	13.825	.175	13.455	14.144
Complications	yes (N=246)	13.561	.168	13.734	14.394
	no (N=108)	14.064	.140	13.286	13.836

A rather smaller sub-sample of participants had acceptance scores for insulin injections. Although there would be reduced power, it was judged reasonable to carry out analyses of variance but age (in years) was entered as a covariate rather than as a set of age groups (inspection of means indicated a strictly monotonic downward trend across age groups).

The results of the analysis with demographic factors are shown in Table 4.68. The age trend was highly significant, and there was a significant difference between means for participants born in the UK (mean = 9.8) and those born in an Asian country (mean = 7.9). Thus UK born and younger participants tended to have more positive perceptions of insulin injections.

Table 4.68: Analysis of variance on relationships between demographic variables and perception/adherence scores for insulin injections.

Source	df	Mean Square	F	p-value
Gender	1	.570	.155	.695
Educational level	3	6.708	1.824	.151
Monthly income	3	2.540	.691	.561
Country of birth (UK/Asian)	1	46.229	12.571	.001
Age group	1	56.039	15.238	<.0005
Error	69	3.677		

Model summary: $R^2 = .462$; adjusted $R^2 = .392$

An analysis of variance on the relationships between health/treatment factors and acceptance of insulin injections is shown in Table 4.69. In this sub-sample, only 3 participants smoked, only 4 used betel nuts, and only 5 did not have complications, so these factors were omitted from the analysis. The only significant effect was that participants who had a preference for a doctor's ethnicity had lower perception/adherence scores (mean = 7.08, SE = .58) that participants who had no such preference (mean = 8.67, SE = .49). In an analysis with both country of birth and preference for a doctor's gender as the only factors, only country of birth was significant. So it appears that preference for a doctor's ethnicity is acting as a proxy for country of birth.

Table 4.69: Analysis of variance on relationships between health/treatment variables and perception/adherence scores for insulin injections.

Source	df	Mean Square	F	p-value
Treatment type	1	7.668	1.554	.217
Family history of diabetes	1	3.781	.766	.384
Pref for doctor's gender	1	.026	.005	.942
Pref for doctor's ethnicity	1	33.688	6.827	.011
Involve companion in appointments	1	13.062	2.647	.108
BMI	1	4.265	.864	.356
Error	72	4.934		

Model summary: $R^2 = .247$; adjusted $R^2 = .184$

Section 3. Attendance at diabetes clinic appointments

The participants were asked to rate their frequency of missing diabetes appointments/clinic on a five-point scale: *always* (0); *usually* (1); *sometimes* (2); *rarely* (3); *never* (4). The *usually*, and *sometimes* responses were not used by any participants. The majority responded *never* (Table 4.70). In view of the narrow spread of responses, participants were dichotomised into those responding *never* (n = 334) and the remainder (n = 69).

Table 4.70: Distribution of ratings of frequency of missing diabetes appointments/clinics

Scoring	No. of participants	Percent
Sometimes	4	1.0
Rarely	65	16.1
Never	334	82.9
Total	403	100.0

A logistic regression analysis was used to examine the relationships between demographic factors and whether or not any appointments were missed (Table 4.71). Age was entered as a covariate (in years) rather than as a set of age groups. The only significant effect was for country of birth. The odds of an Asian-born participant having missed any appointments was 7.38 times the odds for a UK-born participant.

Table 4.71: Logistic regression on relationships between demographic factors and whether or not any appointments were missed.

Source	Wald χ^2	df	p-value
Gender	.170	1	.680
Educational level	2.583	3	.460
Monthly income	.476	3	.924
Country of birth (UK/Asian)	23.718	1	<.0005
Age	2.831	1	.092

Model Summary: Cox & Snell R^2 = .124; Nagelkerke R^2 =.206

A second logistic regression analysis examined the relationship between health/treatment variables and whether or not participants had missed appointment (Table 4.72). Significant effects indicated that smokers were more likely to miss appointments than non-smokers (odds ratio = 4.21), betel users were more likely to miss appointments than non-users (odds ratio = 2.68), participants having a preference for a doctor's gender were less likely to miss appointments than those who had no such preference (odds ratio = .20). There was also a significant effect of treatment type. Participants whose treatments were diet + tablets or diet + tablets + insulin more likely to miss appointments than those whose treatment comprised diet + insulin (odds ratio = 9.00, Wald $\chi^2(1)$ = 5.44, p = .020). The contrast between treatments comprising diet + tablets and diet + tablets + insulin was not significant. When country of birth was added into a logistic regression analysis, together with these significant health/treatment factors, the effect of preferring a doctor's ethnicity became clearly non significant, but the other significant factors remained except that the effect of smoking became marginal (Wald $\chi^2(1)$ = 3.67, p = .055).

Table 4.72: Logistic regression analysis on relationships between health/treatment variables and whether or not participants had missed appointment

Source	Wald χ^2	df	p-value
Smoking	6.795	1	.009
Using betel	4.203	1	.040
Treatment type	6.830	2	.033
Family history of diabetes	.392	1	.531
Pref for doctor's gender	2.759	1	.097
Pref for doctor's ethnicity	13.602	1	<.0005
Involve companion in appointments	.128	1	.720
Complications	1.948	1	.163
BMI	2.755	1	.097

Model Summary: Cox & Snell R^2 = .170; Nagelkerke R^2 =.284

Part 6. Basic Diabetes Knowledge Questionnaire (BDKQ)

This part considers the assessment of the participants' knowledge of diabetes via the Basic Diabetes Knowledge Questionnaire (BDKQ). Twenty-eight questions were designed for this study to sample knowledge in six broad domains.

1.) Basic knowledge about diabetes including symptoms and signs of stress.

2.) Management of diabetes including food types and consumption, exercise and blood testing.

3.) Understanding the need for regular medical check-ups for signs of complications.

4.) Knowledge of risk factors including smoking and alcohol intake.

5.) Knowledge of hypoglycaemia and glycaemic levels.

6.) Understanding the implications of blood pressure.

Scoring:

There were three different response formats in the questionnaire.

1. For items 1 to 24, participants had to choose between responses of *true*, *false* or *don't know*. Each question was assigned a score of 1 for a correct response and 0 for an incorrect response; *don't know* was also regarded as an incorrect answer.
2. In items 25 and 26, participants were asked to specify numerically the ideal lowest and highest glycaemic levels (HbA1c). The scores assigned for these two questions were 1 for a correct specification or 0 for an incorrect or no answer. The correct answer for the ideal lowest should be 4%, and for the ideal highest it could be between 6% and 7.5%.
3. For items 27 and 28, participants were asked to select the correct answer from choice of 4. A score 1 was given for a correct response and 0 for an incorrect or missing answer.

The total BDKQ score was calculated by summing the correct answers, so the range of possible scores was 0 to 28 with high scores indicating better diabetes knowledge. The observed scores ranged from 0 to 28, median = 15, mean = 14.2, SD = 5.05.

BDKQ scores were significantly but weakly correlated with PAD16 scores ($r = -.14$, $p=.006$) and treatment satisfaction scores ($r = .19$, $p<.0005$) indicating that participants with higher levels of knowledge about diabetes tended to have better adjustment to their diabetes and higher levels of satisfaction with their treatment.

Table 4.73 shows the results of a main effects analysis of variance on relationships between BDKQ scores and demographic factors. Estimated means are shown in Table 4.74. Participants born in the UK had significantly higher BDKQ scores than participants born in an Asian country. BDKQ scores were higher with increasing educational levels (linear trend p<.0005) and lower with increasing age (linear trend p<.0005).

Table 4.73: Analysis of variance on relationships between BDKQ scores and demographic factors.

Source	df	Mean Square	F	p-value
Gender	1	7.607	.895	.345
Educational level	3	442.866	52.092	<.0005
Monthly income	3	10.126	1.191	.313
Country of birth (UK/Asian)	1	1432	168.546	<.0005
Age group	4	56.013	6.588	<.0005
Error	390	8.502		

Model summary: $R^2 = .679$; adjusted $R^2 = .668$

Table 4.74: Estimated means from analysis of variance on relationships between BDKQ scores and demographic factors.

	Mean	SE	95%	CI
Gender				
Male (N=221)	14.700	.320	14.071	15.330
Female (N=182)	15.035	.318	14.409	15.661
Educational background				
None (N=76)	10.623	.479	9.682	11.565
< Five years (N=69)	14.219	.432	13.370	15.068
Five years + (N=222)	15.177	.315	14.558	15.796
Higher education (N=36)	19.451	.519	18.432	20.471
Monthly income (£)				
None (N=35)	14.346	.547	13.271	15.421
£1 – 500 (N=296)	15.154	.254	14.655	15.654
£501 – 1000 (N=53)	14.576	.437	13.717	15.436
£1001 – 1500 (N=19)	15.394	.698	14.023	16.766
Country of birth				
Asian-born (N=193)	12.410	.547	13.271	15.421
UK-born (N=210)	17.325	.340	16.656	17.995
Age				
≤ 35 (N=23)	16.065	.637	14.751	17.258
36 to 45 (N=37)	16.256	.507	15.259	17.255
46 to 55 (N=79)	14.067	.382	13.315	14.819
56 to 65 (N=105)	14.282	.372	13.550	15.014
66+ (N=159)	13.728	.348	13.044	14.412

Table 4.75 shows an analysis of variance on relationships between health and treatment variables and BDKQ scores, and means are displayed in Table 4.76. There was a significant effect of treatment type, with participants whose treatment comprised

diet + tablets clearly having lower levels of knowledge about diabetes than the other two groups whose treatment involved insulin. Presumably, this was because the severity of disease in the latter two groups, and/or the demands of the more complex treatments, required more care and attention to ensuring that patients understood explanations about the nature of the disease and its treatment. Participants who had a preference for a doctor's gender, or for a doctors' ethnicity, had significantly lower BDKQ scores than those without such preferences. Participants who involved a companion in appointments also had lower scores than those who did not.

Table 4.75: Analysis of variance on relationships between BDKQ scores and health and treatment variables.

Source	df	Mean Square	F	p-value
Smoking	1	.199	.019	.892
Using betel	1	7.189	.670	.414
Treatment type	2	229.257	21.367	<.0005
Family history of diabetes	1	11.499	1.072	.301
Pref for doctor's gender	1	138.312	12.891	<.0005
Pref for doctor's ethnicity	1	1481.946	138.116	<.0005
Involve companion in appointments	1	155.432	14.486	<.0005
Complications	1	.915	.085	.770
BMI	1	.892	.083	.773
Error	392	10.730		

Model summary: $R^2 = .590$; adjusted $R^2 = .580$

Table 4.76: Estimated means from analysis of variance on relationships between BDKQ scores and health/treatment variables.

	Mean	SE	95%	CI
Smoke				
Yes (N=24)	14.332	.796	12.768	15.897
No (N=379)	14.237	.486	13.281	15.193
Use of betel nuts				
Yes (N=28)	14.570	.801	12.996	16.144
No (N=375)	13.999	.476	13.063	14.936
Treatment type				
diet + tablets (N=324)	12.341	.490	11.378	13.304
diet +insulin (N=49)	15.261	.696	13.894	16.629
diet + tablets + insulin (N=30)	15.252	.805	13.670	16.834
Family history of diabetes				
Yes (N=150)	14.470	.579	13.332	15.609
No (N=253)	14.099	.595	12.930	15.268
Pref. for doctor's gender				
Yes (N=62)	13.327	.549	14.163	16.322
No (N=341)	15.242	.682	11.985	14.668
Pref. for doctor's ethnicity				
Yes (N=165)	11.529	.638	15.786	18.294
No (N=238)	17.040	.573	10.403	12.655
Involve companion in appointment				
Yes (N=109)	13.320	.579	14.112	16.387
No (N=294)	15.249	.647	12.049	14.591
Complications				
Yes (N=292)	14.343	.652	12.944	15.509
No (N=111)	14.227	.527	13.306	15.379

A final analysis of variance examined the relationships between BDKQ scores and the demographic and health/treatment factors that were significant in the two preceding analyses (Table 4.77). The inclusion of the demographic variables made the effect of involving a companion in appointment non-significant, but the effects of treatment type, having a preference for a doctors' gender and having a preference for a doctors' ethnicity remained significant. As predictors of BDKQ scores, the two factors concerned with preferences about a doctor were clearly not just proxies for one of the demographic variables.

Table 4.77: Analysis of variance on relationships between BDKQ scores and demographic and health/treatment factors significant in the two preceding analyses

Source	df	Mean Square	F	p-value
Educational level	3	294	39.313	<.0005
Country of birth (UK/Asian)	1	307.211	40.970	<.0005
Age group	4	16.689	2.226	.066
Treatment type	2	104.679	13.960	<.0005
Pref for doctor's gender	1	76.595	10.215	.002
Pref for doctor's ethnicity	1	100.027	13.340	<.0005
Involve companion in appointments	1	12.906	1.720	.191
Error	389	7.498		

Model summary: $R^2 = .716$; adjusted $R^2 = .706$.

Part 7. Usage of alternative treatments – medicinal plants for diabetes

This part focuses on the usage of medicinal plants for the treatment of diabetes mellitus and its complications. Participants who reported having used an alternative treatment, especially herbal remedies, for their diabetes and/or its complication(s) were then asked to specify the name(s) of the plant(s) used and number of times using that plant(s). Additional questions explored the participants' discovery of using herbal remedies, whether they informed health care professionals, and their recommendation of this usage to other diabetics.

Thirty five percent of participants (n = 139) admitted using unconventional therapeutic methods for their diabetes or its complications, in combination with the prescribed medications (Figure 4.1). Most of the participants (n = 134) reported using medicinal plants. Sixty percent of medicinal plant users reported using it on a daily basis (n = 80/134) and the other 40% (n = 53/134) reported using it at least once a month (Table 4.78).

Figure 4.5 Usage of unconventional therapeutic methods for diabetes mellitus

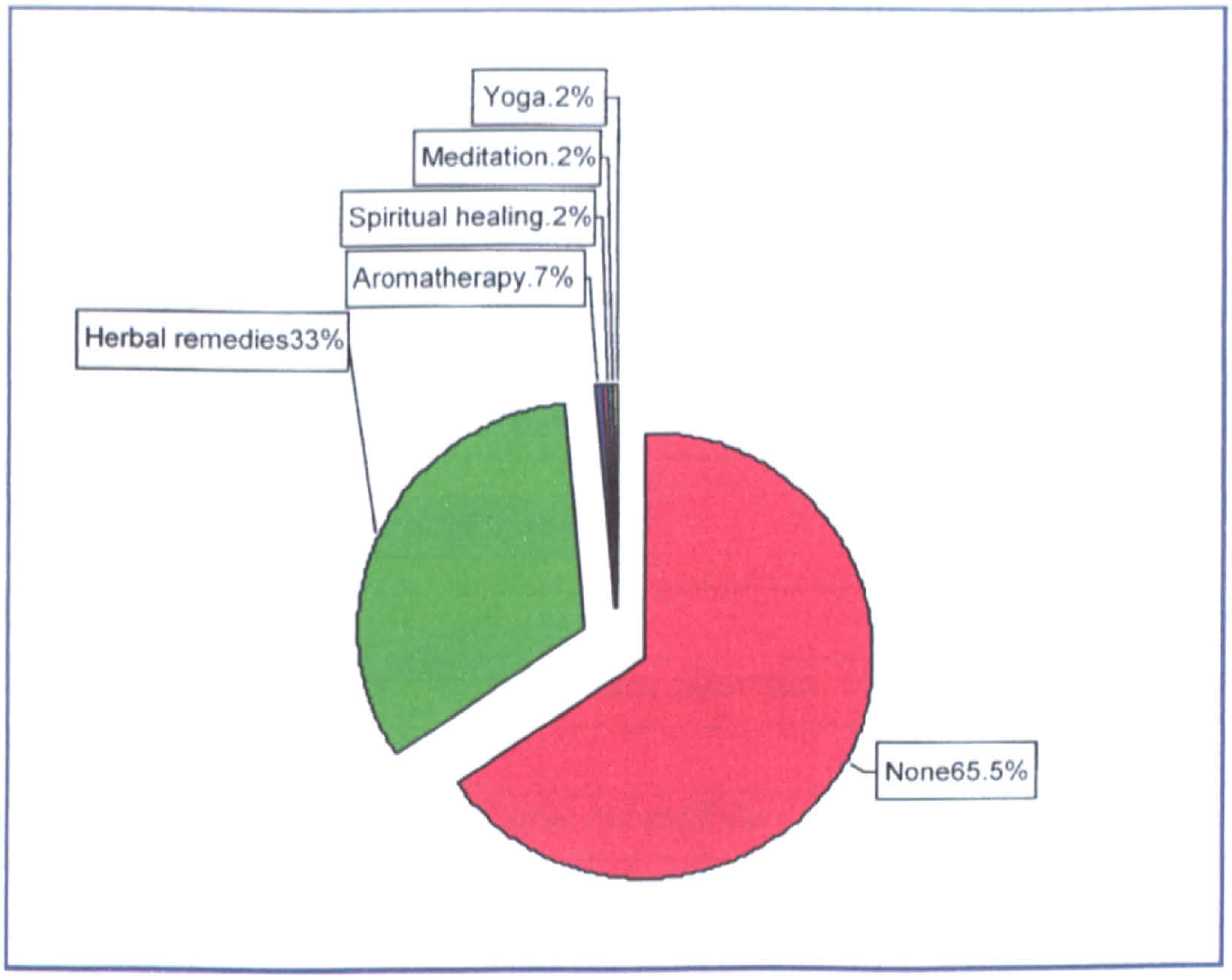

Table 4.78: Distribution of reported frequency of using unconventional therapeutic methods for diabetes mellitus (n=139)

Frequency of usage	No. of users	Percent
Once a month	6	4
Once a week	53	38
Daily	80	58

Twenty-five kinds of herbal preparations were mentioned as herbal remedies for diabetes (Table 4.79). The three most frequently mentioned were fried karela (109 mentions); karela juice (100 mentions), and *Aloe vera* (64 mentions) (Table 4.55).

Table 4.79: List of plants and remedies that mentioned as herbal remedies for diabetes mellitus

Names of plants/preparation	Botanical name	Number of mentions
1. Home made fried karela	*Momordica charantia*	109
2. Home made karela juice	*Momordica charantia*	100
3. Aloe vera jelly	*Aloe vera*	64
4. Pine forest honey	-	24
5. Commercial karela extract	*Momordica charantia*	21
6. Nim		20
7. Bhadraphash (mixed crushed dried herbs)	-	19
8. Sarota	-	18
9. Commercial karela tablets	*Momordica charantia*	13
10. Methi	-	12
11. Lime juice	*Citrus aurantifolia*	11
12. Tamarind seed	*Tamarindus indica*	10
13. Raw garlic	*Allium sativum*	9
14. Limdo stick	-	9
15. Chic peas	*Cicerarie tinum*	7
16. Fried onion	*Allium*	7
17. Unknown mixed herbs	-	7
18. Commercial garlic tablets	*Allium sativum*	7
19. Fresh grapefruit	*Citrus maxima*	6
20. Wooden tumblers	-	5
21. Dried turmeric powder	*Curcuma*	4
22. Onion seeds	*Allium*	4
23. Cerasee tea	*Momordica charantia*	2
24. String beans	*Pisum sativum*	2
25. Periwinkle	*Vinca*	2
26. Boiled cabbage	*Brassica*	2
27. Guava fruit	*Psidium guajava*	1
28. Commercial evening primrose tablets	*Oenochera biennis*	1
29. Celery juice	*Apium*	1

Informing health care professionals of the usage of unconventional therapeutic methods

Only 16.6% of users (n = 23/139) had informed the doctor or other health care professionals of their usage of this additional form of medication. The remaining 83.4% (116/139) would rather keep this secret from health care providers involved with their diabetes. Most users felt that knowing of this usage might be disagreeable for their doctors' opinions, so they would prefer to keep it secret.

How participants discovered the use of unconventional therapeutic methods for diabetes

Nine different sources of information were mentioned (Table 4.80). The sources most frequently mentioned were: a diabetic friend; own and family knowledge; and a healer in the motherland.

Table 4.80. Sources of information discovery

Source of information	No. of mentions	Percent
1. From a diabetic friend lives in the UK	79	56.8
2. Own & family's knowledge	26	18.7
3. From a healer in the motherland	14	10.0
4. From media advertising in the UK (i.e. newspaper, radio, TV)	9	6.4
5. From a medical staff works in the UK	4	2.7
6. From a herbal remedies healer based in the UK	3	2.0
7. From a dm. friend lives in mother's land	3	2.0
8. From a medical staff in the mother's land	1	0.7
9. From media in the mother's land	1	0.7
Total	139	100.0

Recommending the usage of unconventional therapeutic methods to other diabetics

Ninety six percent of users (n = 133/139) reported that they were very happy to recommend the usage of unconventional therapeutic methods to other diabetic patients. Only five users (4 %) were reluctant to make any recommendation.

Factors associated with the use of medicinal plants

Logistic regression analyses were carried out to explore which variables might discriminate between the 134 participants who used medicinal plants, and those who did not. The first analysis (Table 4.81) examined demographic factors. Participants born in an Asian country were more likely to be users than those born in the UK (odds ratio = 35.90) and females were more likely to be users than males (odds ratio = 2.77). Usage was highest at the lowest educational level (no schooling), falling to a minimum in the third group (five years schooling or more) before rising among those participants with higher education. This pattern was paralleled by the effect of monthly income; usage was highest among those with no income, falling to a low among those with a monthly income in the range £501-£1000, and rising again in those with a monthly income of £1001-£1500. Despite the striking similarity in the effects of educational level and monthly income level, we can be confident that they are independent effects since each effect is automatically partialled from the other in the logistic regression analysis. Nonetheless, it seems likely that both reflect tendencies for herbal remedies to be favoured among the lower socio-economic groups because they are seen as traditional remedies by the least westernised participants in the sample. In contrast, it is likely that those in the highest social economic groups tended to use these medicines because they saw them as *alternatives* to mainstream remedies.

Table 4.81: Logistic regression analysis on relationships between demographic factors and usage of medicinal plants.

Source	Wald χ^2	df	p-value
Gender	7.632	1	.006
Educational level	8.576	3	.035
Monthly income	14.604	3	.002
Country of birth (UK/Asian)	66.281	1	<.0005
Age group	.873	4	.938

Model Summary: Cox & Snell $R^2 = .410$; Nagelkerke $R^2 = .570$.

A second logistic regression analysis examined the effects of health and treatment variables (Table 4.82). Significant effects indicated that participants who used betel were more likely to use medicinal plants than those who did not (odds ratio = 6.91), those who reported a preference for a doctor's ethnicity were more likely to use medicinal plants than those who did not (odds ratio = 18.52), and those who had no complications were more likely to use medicinal plants than those who had complications (odds ratio = 2.59).

Table 4.82: Logistic regression analysis on relationships between usage of medicinal plants and health and treatment variables.

Source	Wald χ^2	df	p-value
Smoking	.350	1	.554
Using betel	7.239	1	.007
Treatment type	5.481	2	.065
Family history of diabetes	2.775	1	.096
Pref for doctor's gender	.133	1	.715
Pref for doctor's ethnicity	56.364	1	<.0005
Involve companion in appointments	1.542	1	.214
Complications	5.206	1	.023
BMI	.694	1	.405

Model Summary: Cox & Snell R^2 = .410; Nagelkerke R^2 = .570

A further logistic regression examined the roles of the significant demographic variables and the significant health and treatment variables, when these were combined into a single analysis (Table 4.83). The only effect to become non significant was that of educational level. None of the health/treatment variables alone was sufficient to bring about this change; the most important two-factor combination was betel usage and having a preference for a doctor's ethnicity.

Table 4.83: Logistic regression analysis on relationships between usage of medicinal plants and demographic and health and treatment variables significant in preceding analyses

Source	Wald χ^2	df	p-value
Gender	7.828	1	.005
Educational level	5.695	3	.127
Monthly income	13.691	3	.003
Country of birth (UK/Asian)	17.517	1	<.0005
Using betel	6.088	1	.014
Pref for doctor's ethnicity	6.397	1	.011
Complications	8.786	1	.003

Model Summary: Cox & Snell $R^2 = .449$; Nagelkerke $R^2 = .624$

It is to be expected that the measures of adjustment to diabetes, knowledge about diabetes, satisfaction with treatment and adherence to regimen (to diet, exercises and blood testing) would also be predictors of which participants were using medicinal plants. A logistic regression analysis reported in Table 4.84 confirms this. Participants with higher PAD16 scores (less well adjusted), lower treatment satisfaction scores, lower BDKQ scores and lower adherence scores were more likely to be users of medical plants.

Table 4.84: Logistic regression analysis predicting usage of medicinal plants from PAD16 (adjustment) scores, treatment satisfaction scores, BDKQ (knowledge) scores and adherence scores

Source	Wald χ^2	df	p
PAD16 (adjustment to diabetes)	12.151	1	<.0005
Treatment satisfaction	19.515	1	<.0005
BDKQ (knowledge of diabetes)	25.173	1	<.0005
Adherence	14.219	1	<.0005

Model Summary: Cox & Snell R^2 = .327; Nagelkerke R^2 = .454

When these four variables were added to the logistic regression involving previously significant demographic and health/treatment variables (Table 4.85), the previously significant effect of having complications became non-significant. In fact, the addition of either PAD16 scores or treatment satisfaction scores (but not BDKQ scores or adherence scores) was sufficient to abolish the significant effect of having complications. Thus the relationship of medicinal plant usage and having complications is not independent of the relationship of medicinal plant usage with adjustment to diabetes (PAD16 scores) and treatment satisfaction. Also, in the logistic regression reported in Table 4.85, the inclusion of the demographic and health/treatment variables made the effects of PAD16 scores and BDKQ scores non-significant. The inclusion of both country of birth and having a preferences for a doctor's ethnicity was sufficient to abolish the significance of BDKQ scores, but neither variable alone had this effect, so we can conclude that there are interdependencies between the effect of BDKQ scores on medicinal plant usage, and the effects of country of birth and having a preferences for a doctor's ethnicity

Table 4.85: Logistic regression analysis predicting usage of medicinal plants from demographic variables, health/treatment variables, plus PAD16 (adjustment) scores, treatment satisfaction, and BDKQ (knowledge) scores.

Source	Wald χ^2	df	Sig.
Gender	12.804	1	<.0005
Monthly income	14.817	3	.002
Country of birth (UK/Asian)	13.055	1	<.0005
Using betel	4.447	1	.035
Pref for doctor's ethnicity	12.526	1	<.0005
Complications	.246	1	.620
ATT16 (adjustment to diabetes)	2.337	1	.126
Treatment satisfaction	10.432	1	.001
BDKQ (knowledge of diabetes)	2.708	1	.100
Adherence	5.884	1	.015

Model Summary: Cox & Snell R^2 =.473; Nagelkerke R^2 =.658

DISCUSSION

This section discusses the findings from the interviews, focusing on distinctions between the two groups: (1) participants born in an Asian country (or sometimes called 'British Indo-Asians' as they are currently living in Britain) and (2) participants born in the UK, and will be carried out against the backdrop of issues identified through the literature review. The first part of this chapter discusses the demographic and health/treatment distinctions between participants born in the UK and those born in an Asian country. It then covers a number of psychological and behavioural measures:

- Psychological adjustment to having diabetes;
- Treatment satisfaction ratings, which include (1) understanding how treatment works and (2) the perceived value of communication in participants' own language;
- Self-care behaviour, such as adherence to diet, exercise, blood tests, perception/adherence to taking tablets and insulin and attendance to diabetes clinic/appointments;
- Diabetes knowledge;
- Use of unconventional therapeutic method – particularly, medicinal plants and factors predicting usage of medicinal plants.

Distinctive characteristics of Asian-born and UK-born people with diabetes mellitus

This study has identified a marked difference between patients with diabetes from two different cultural backgrounds (Asian-born and UK-born). These differences started from family composition. Asian-born people with diabetes tended to have higher number of children and people living in their house, compared to UK-born diabetic patients. This is consistent with reports of Ritch and colleagues (1996). The UK group contained a large proportion of the elderly, unmarried women or widows living alone, while elderly Asians were more likely to be living in a larger household. Not surprisingly, this trend reflects a close relationship between individuals within Asian's families, especially between elderly parents and their grown-up children. Caring for their elderly parents is a cultural ideal held by the Asian population. Living within a multigenerational household provides considerable social support for a person with diabetes, but it can be also lead to over crowding, especially if the house is not designed for these types of domestic arrangement, for example, use of dining room or living room as a bedroom or sharing a bedroom with someone else, i.e. a grandchild (personal experience with folklore).

This study found a high number of Asian-born diabetics, especially in older females with a lower level of educational background or none at all, compared to the UK-born diabetics. This may have contributed to poor rates of responses to the initial written appointment letter prior to a telephone call made by an Asian link worker. Culture is thought to affect the way an individual perceives his/her illness or who he/she may turn to, especially if the individual has a limited educational background (McAvoy and Donalson, 1990). This demonstrates a large pool of people who might be currently having difficulties with language and understanding when accessing western medical services. These difficulties have already been highlighted (Hawthorne, 1997), and the way to overcome these problematic issues was demonstrated by Wilson and colleagues (1993). Ritch et al. (1996) found over eighty percent of elderly Indo-Asians were unable to understand English. Health providers cannot ignore such difficulties the Indo-Asians are experiencing. Poor educational background generally linked with poor communication that could lead to non-adherence and a lack of awareness of available services, and ultimately, unavoidable complications, which could cost money and life.

Not surprisingly, level of educational background predicted income. This study found that females from both origins had lower incomes than males. However, people from Asian origins tended to have lower incomes than those born in the UK. It was showed that deprivation is one of many factors linked with increased prevalence of NIDDM and diabetes complications (Kelly, et al., 1993; Chaturvedi, et al., 1996), typically diabetic eye disease (Eachus, et al., 1996). Diabetes is common in deprived areas, for example Foleshill, Coventry (Simmon and Powell, 1993). Eachus and colleagues (1996) found that people with diabetes living in a deprived area have higher risk factors from diabetes complications than those living in an affluent area. This may be because they are more likely to be obese, smokers, having higher blood pressure, and having poorer diabetes self care (Unwin, et al., 1995).

In this study, smoking is uncommon, especially among the Indo-Asians with diabetes. Approximately, six percent of the participants admitted to a smoking habit and seven percent admitted to a habit of using betel-nuts, typically Bangladeshi males. There were, however a high number of obese subjects, and more than half of the participants reported using blood pressure tablets, and thirty seven percent of participants recalled relatives who had diabetes. This study confirms the finding of

Eachus and colleagues (1996). Over than half of the participants reported at least one of the eight categories of complications. Monthly income and country of birth were significant mutually independent demographic predictors for diabetic complications. Diabetic complications are very common among people of Asian origin and those with the lowest level of income band (£1 - £500). This study may reflect a picture of the future with a large pool of people with diabetic complications if these situations and/or conditions were to be ignored. There was a marked tendency for complications to be most likely in those people taking higher doses of diabetes tablets.

Dealing with western health care professionals can be a daunting experience for people of Indo-Asian origin who cannot speak English and who were not culturally familiar with the system and service. The term 'western' used in this study refers to things, people, ideas and ways of life that come from or associated with the United States, Canada, and the countries of Western, Northern, and Southern Europe. It is not surprising to find that high number of Indo-Asians, especially females with diabetes reported having a preference for a doctor's gender. Gender and country of birth were independent predictors for preference for a doctor's gender. However, in terms of preference for a doctor's ethnicity, gender, country of birth, age group and educational level were independent predictors. Usage of a non-professional interpreter, e.g. a family member is quite common among the minority ethnic groups. Unfortunately, information given by health providers sometimes may not clearly be understood if the interpreter is too young so unavoidably this could be incorrectly or unfully interpreted. The needs for a professional interpreter is now recognised by many health authorities. In recent years the NHS has responded by appointing more bilingual medical and administrative staff as well as health advocates and link workers (Baylav, 1996). These endeavours however appear still to fall short; health care workers struggle to provide adequate care but are prevented by an institutional orientation towards a standard service, no longer appropriate for a heterogeneous population (Jones and Gill, 1998). Health authorities still lack knowledge about the languages spoken in their districts and of the extent of the need for interpreter services. Inadequate resources devoted to communication and information services underlie impaired services for patients from the ethnic minority groups (Watt, et al., 1993). This has led to the regular use of family members as interpreters, despite the fact that it is widely acknowledge that this method is particularly unsatisfactory, especially if a child acts as an interpreter (Phelan and Parkman, 1998). A number of studies have identified the value of an interpreter (Asian link worker) in the care of diabetes among the Indo-Asian patients (Wilson, et al., 1993; Gillam and Levenson, 1999). It was said that a link worker could bridge the gaps between doctors and patients in terms of culture, class, beliefs, trust and many other factors (Baylav, 1996). Nevertheless, the care still needs to be addressed. As such link workers should be able to explain advice in terms compatible with the patient's values, beliefs, knowledge and assumptions, and should not include his or her own advice when translating (Govindji, 1992). It might seem appropriate that a link worker is selected from a non-medical group, but is fluent in the appropriate language(s) and is familiar with the cultural and religious beliefs of the target population. However, if an interpreter is not available, Mares and colleagues (1985) have suggested two practical ways in which health care providers (doctors and nurses) can improve communication with patients who speak little or no English.

No. 1. Reducing stress by:

- allowing more time to communicate than would be required with an English-speaking patient;
- giving plenty of non-verbal reassurance;
- trying to inform about what's going to happen next, at a very simple level;

- trying to pronounce the patient's name correctly;
- getting the patient's name right;
- trying to find out whether the patient has any specific fears or worries;
- writing down any important points clearly and simply on a piece of paper for the patient to take away.

No. 2. Simplifying the English, for example...

- speaking clearly and slowly with soft tone;
- using the words that the patient is likely to understand;
- being careful of idioms;
- giving a simple instructions in a clear, logical sequence;
- strictly by keeping to one topic at a time;
- using pictures or clear mime to help get the meaning across.

It is not surprising to discover that a large number of British Indo-Asians with diabetes involve others in attending clinic appointments, especially those who are females, having low level of education and income and having preferences to a doctor's gender and ethnicity. This may indicate a requirement for a link worker within these surgeries if the linguistic problems described earlier were to be avoided.

In summary, there are demographic differences between diabetic patients born in the UK and Asian-born in terms of family composition, educational level, income, diabetic complications, and preferences for a doctor's gender and a doctor's ethnicity.

The study demonstrates and confirms a strong link between deprivation and diabetic complications, typically with problems linked with the eyes, feet, nerves and skin.

There was also a marked difference in the likelihood of diabetic complications between people with diabetes born in the UK and those Asian-born. Females and Asian-born diabetics are more likely than males and those born in the UK to have a preference for a doctor's gender. Communication difficulties were identified through a preference for a doctor's ethnicity within the British Indo-Asian with diabetes. The use of a link worker, preferably from a non-medical background, is recommended as a solution to overcome the cultural and religious differences, and linguistic barriers.

Factors influencing psychological adjustment to diabetes

The assessment of psychological adjustment to diabetes was carried out using sixteen attitudinal statements. This scale, PAD16, measures the extent to which diabetes is integrated into a patient's lifestyle and personality. It is applicable to both IDDM and NIDDM. The reliability of the PAD16 is high with a Cronbach alpha coefficient of .98. Its simplicity makes it a user-friendly, and useful in a busy diabetes clinic as it can be completed and scored in a short time. Participants with high scores on PAD16 typically would be resentful, embarrassed, anxious, isolated and helpless, and have poor adjustment to their diabetes, while those scoring low are more accepting of their diabetes, comfortable with public awareness, calm with a sense of self-control and feel well adjusted to their diabetes.

This study found participants using betel-nuts, treatment involving insulin, family history of diabetes, having a preference for a doctor's gender, having complications and having higher BMI as less well adjusted to their diabetes. Such effects are independent of having a low income and being born in an Asian country rather than the UK, factors that are also associated with relatively poor adjustment to diabetes. This is consistent with a number of reports, which found that attitudes towards having diabetes differed between patients with complications and those without complications (Dunn and Beeney, 1998), between patients using insulin and patients not using insulin (Anderson, et al., 1997), and between males and females with IDDM (Fitzgerald, et al., 1990; Montague, 2002), but it is inconsistent with Fitzgerald, et al., (1998) and Fitzgerald, et al., (2000), whose reports indicated no significant contrast between African-American and Caucasian patients in attitudes towards having diabetes, and Fitzgerald, et al., (1990), where attitudes between males and females with NIDDM using insulin were found to be similar. Presumably, the samples in Fitzgerald and colleagues' studies (1998; 2000) did not experience language difficulties as the sample within this study did. Accessing a western service and system is daunting for someone who is culturally unfamiliar with the system, and increasingly more challenging if the person cannot understand the language. A language barrier is known to have caused frustration and confusion (Baylav, 1996). Poor self-care behaviour was attributed to poor diabetes knowledge, which is an effect from communication difficulties (Wilson, et al., 1993).

Helman (1990) suggested that patient's beliefs, attitudes, and behaviour could be influenced by cultural and socio-economic factors. The relationship of culture to health beliefs, attitudes, and behaviour is especially important in the treatment of diabetes, which usually involves changing patterns of eating, physical activity, and other culturally influenced behaviour. For the treatment recommendations to be effective, they must be sensitive and relevant to the culture of the people who are expected to carry them out.

There are speculations that deprivation is linked with the high prevalence of NIDDM among British Indo-Asians (William et al., 1994). There were a number of issues related to this speculation, including stress from having difficulties in accessing to, and use of, health services for diabetes (Hawthorn, 1994). Undoubtedly, the experience of having a disease and having to adjust to it in accordance with advice and treatment, which is not familiar to the people of ethnic minority group, could have an important impact on the person's emotions. However, this may be minimised if language and cultural barriers were overcome or bridged through a use of bilingual advocate.

Independent factors mediating treatment satisfaction/dissatisfaction scores

This study demonstrates not just a marked difference in treatment satisfaction/dissatisfaction scores between the Asian-born and the UK-born diabetics, but also between the age groups, between the different levels of educational background and between groups with and without complications. UK-born people seemed more satisfied with western medication/treatment, health care providers and its advice than those born in an Asian country.

Satisfaction is multidimensional (Fitzpatrick, 1991). It is the product of a complex interaction between patients' perceptions and expectation together with their history of care and their emotional state (Linda, 1982). In a similar way, the importance of the nature of the social relationship and interaction between doctor and patient is strongly related to patients' expressed satisfaction (Blanchard, et al., 1990; Krupat, et al., 2002), and the doctor's consulting style (Pendleton, et al., 1984; Bradley, 1994), or even if the patients participated in medical decision making (Golin, 2002). When faced with a doctor from a western culture, most British Indo-Asians who are not totally westernised experience a cultural barrier in both verbal and non-verbal forms (McAvoy and

Donaldson, 1990). For example, a British Indo-Asian female would feel utterly uncomfortable to be touched or examined by a male doctor; so would a British Indo-Asian male if he were to be examined by a female doctor. Expression of less satisfaction among the British Indo-Asian patients may be attributed partly to cultural barriers, language difficulties and a personal expectation. Unable to understand properly might have led some British Indo-Asians to misuse or even to be reluctant to use recommended medical regimens all together. Poor health outcomes in British Indo-Asians have been attributed to communication problems and limitations in access to health care services (Hawthorne, 1990; Burden, 1993). Expressed treatment satisfaction tends to increase with age (Hall and Dornan, 1990). In this study, satisfaction scores increased with age, with a significant linear trend across the age groups. It could be that as people get older they tend to be more reluctant to criticise the health care received. Redekop and colleagues (2002) found that young patients, patients using insulin, and patients with high HbA1c levels were less satisfied with the treatment than other patients. Notably, there is a marked difference in treatment satisfaction scores between treatment types found in this study. Expressed satisfaction was high in patients using diabetes tablets rather than in the insulin injection group or the group prescribed both diabetes tablets and insulin injection group. This may reflect a relationship of social discomfort/inconvenience and the use of conventional insulin injections. However, if the medical regimen were easier, more convenient and socially comfortable to use then the overall satisfaction would likely to be improved as well, e.g. inhaled insulin vs. subcutaneous insulin injection, (Howorka, et al., 2000; Gerber, et al., 2001; Cappelleri, et al., 2002).

Hall and Dornan (1988) also indicate that greater satisfaction is significantly associated with lower educational status. In this study, satisfaction scores appeared to be different across the groups of educational level. Presumably, the participants with the highest educational level were better placed to evaluate their situation, while the participants with low educational background were, like the older age group, reluctant to be critical to their health care received. In terms of health status, this study has found that the greater satisfaction is significantly associated with absence of complications. A number of studies indicated that dissatisfaction is related to poor health and that those with complications tend to be more dissatisfied (Hall, et al., 1982; Patrick, et al., 1983).

The inverse relationship between treatment satisfaction and adjustment to having diabetes (PAD16) indicates that participants who were dissatisfied with their treatment were less well adjusted to their diabetes. Hjortdahl and Laerum (1992) point out that care, which is less satisfactory to a patient is associated with non-adherence with treatment, re-missed appointments, and poor understanding and retention of medical information. Furthermore, high levels of satisfaction can exist alongside high levels of complaints.

Factors influencing self-rating of the understanding of how treatment works

It was found that age group; complications and country of birth were independent predictors of self-ratings of the understanding of how treatments work. These ratings differed between the diabetics born in an Asian country and those born in the UK.

Participants born in an Asian country indicated a lower level of understanding than those born in the UK, and understanding also appears to decline with age. The British Indo-Asian group, typically the older people also had lower educational levels. The low understanding within the Asian group is most probably a reflection of language difficulties and the cultural dissimilarity between the doctor and the patient. Low understanding among the older age group might also relate to various factors including audio deterioration and information retention. If information was given with too much jargon, unclear Pidgin English, or even speaking too fast, it is unlikely that an older person or a person who speaks little or no English would understand. When dealing with patients who can speak little English, a heath provider cannot assume that they totally understand what these have been told if there were no questions being asked. Communication could be a challenge when the health provider (doctor/nurse) and the service user (patient) do not share the same language and culture (Baylav, 1996). Improving communication skills might improve patients' adherence with advice and treatment, and also their satisfaction and understanding (McAvoy and Sayeed, 1990). A number of authors have recommended a variety of steps to overcome language difficulties and barriers (see Baylav, 1996; Mares, 1985). In terms of health status, low self-rating of understanding among patients with complications probably reflects an unsatisfactory feeling towards poor health, which echoes the understanding of how the medication should work on his/her ill-health.

The relationship between understanding, recall and adherence has been investigated in a number of studies. Ley (1983) found a relationship between understanding and adherence, but adherence is not necessarily improved by increased recall, as adherence is more likely to be affected by the regimen to be adhered to rather than the patient's recall of information about it (Kravitz, et al., 1993).

Factors influencing the value of communication in participants' own language

A high percentage of people within Indo-Asian group reported wanting to have health information written in Asian languages and having health care staff speaking

Asian languages. People who highly valued communication in their own language were those who involved a companion in appointments, had a preference for a doctor's ethnicity, used diet + tablets to treat their diabetes, and had complications. A preference for a doctor's ethnicity and involving a companion in appointments were the factors associated with people born in an Asian country. It seemed that those who rated highly the value of communication in their own language would most likely be the people who prefer to read information written and spoken in their own language. This does not necessarily mean that there is a lack of bilingual health advocates and written information in Asian languages available for these ethnic minority communities. In fact, growing awareness of the particular needs of health service users from the minority ethnic community over the past 20 years, has resulted in various bilingual, advocate schemes across Britain (Gillam and Levenson, 1999). However, information discovered here may highlight a high demand for communication clarity within this group, and those existing schemes should be accessible to this community. This study underlines the importance of considering local ethnic minority needs in the planning and delivery of health services, particularly with regard to preparing health education programmes or materials. Communication difficulty was a practical problem for British Indo-Asians compared with the majority of the indigenous population (Shillitoe, 1988). A study found also that lack of knowledge about diabetes and self-management of the disease were attributed to difficulties in communication among the British Indo-Asians (Wilson, et al., 1993). A study in Australia also showed that those patients who were fluent in English were much better able to take care of themselves than those whose English was poor (Fowler, et al., 1987). Noticeably, using a member of the family was relatively common among the British Indo-Asian diabetics. As mentioned earlier, they are far from ideal as interpreters, particularly spouses acting for each other, or children for parents. A number of studies also found that health care providers caring for migrants with diabetes have often perceived communication difficulties and cultural dissimilarities as an effect on adherence (Murphy and Macleod-Clark, 1993; Hjelm, et al., 1998). The answer to this problem was seen to be the provision of more bilingual health advocates, who come from the same community and culture as the patients (Baylav, 1996), plus written information in patients' native languages. Otherwise it is likely that people from the minority ethnic group would:

- avoid making use of NHS services, except in emergencies;
- see health care professionals alone and hope to use gestures to communicate;
- go privately (if they can afford it) to doctors who speak their own language;
- take relatives (often children) or friends along;
- pay people to help at consultations;
- get help from community interpreters or volunteers from local community organisations;
- try to go to those few doctors or hospitals who have access to professional bilingual health advocates.

In terms of complications, there was a significant relationship between complications and people born in an Asian country. People born in an Asian country were more likely to report more numbers of categories of complications than among those born in the UK. This result is similar to a study of Hawthorne (1990). Hawthorne found that Asian patients (matched for age and sex) consistently showed poorer glycaemic control than their white counterparts. The difference between this study and Hawthorne (1990) is that the evidence of complication(s) is derived from a report from a participant's own experience without any biomedical tests. Poor access to health care and difficulty in obtaining it (Hawthorne, 1994) and language problems (Sturman and Beevers, 1990) might additionally contribute to poor blood glucose control and knowledge about diabetes in this ethnic minority group.

In this study, poor education, poor monthly income and unemployment seemed more common among people born in an Asian country than those born in the UK. Poor education, poverty and difficulties with communication may conspire with genetic factors such as a decreased insulin sensitivity (McKeigue et al., 1991), which made good glycaemic control difficult to achieve and diabetes complications unavoidable. The relationship between treatment type and reported value of communication in the participants' own language was complicated. Participants on a diet + insulin regime were significantly less likely to value communication in their own language than either those on diet + tablets regime or those on a diet + tablets + insulin. However, there was a marked tendency for more complications among those participants who reported using higher doses of tablets ($r = .243$, $p < .005$), which was significantly associated with people born in an Asian country.

Factors influencing self-care behaviour

The definition of good adherence is controversial and difficult to evaluate. Several methods have been used to assess whether patients adhere to the prescribed medication or advice on diet, exercise, blood glucose monitoring, or programs such as cessation of cigarette smoking. Studies that rely on patient self-report are less expensive than those using either a record of HbA1c or MEMS (Medical Event Monitoring Systems), which are regarded as the most accurate measurement for adherence to medication (Miller et al., 1987; Winkler et al., 2002). As mentioned by Toobert and Glasgow (1996), each method or type of measurement strategy has limitations and strengths. One solution is to use multiple measures of adherence to each aspect of the regimen (Winkler et al., 2002), but due to feasibility issues, most studies have relied predominantly upon self-report measures. Edelmann, (2000) also pointed that there is little relationship between the different methods used to assess adherence. Although results of self-reports tend to be improved if the patient was led to believe that other sources of information would also be used to verify their report (Stacy et al., 1985). The measurement of adherence, in this study, was from patient self-reports. Questions were designed to be simple and direct so that the inaccuracy of self-reports of adherence to medication regimens could be minimised (Kaplan and Simon, 1990). In terms of adherence to dietary and exercise regimens assessment, this can only be done through self-reports (Camody, et al., 1987).

Adherence to diet, exercise and blood testing

This study found that country of birth, a preference for a doctor's gender, family history of diabetes, complications, treatment types, smoking and using betel-nut were predictors of adherence to diet, exercise and blood tests. It was also found that there was a contrast between the ethnic groups. This finding is consistent with a study carried out by Karter and associates (2000), whose study was more concerned with self-monitoring of blood glucose. In this study, participants born in an Asian country and having a preference for a doctor's gender reported lower adherence rates than those born in the UK. Self-rating of understanding of how the prescribed treatment works was significantly lower in participants born in Asian countries compared with those born in the UK. Values ascribed to staff speaking and health information being written in Asian languages were also significantly higher among persons born in an Asian country. Communication difficulties may have limited and imposed barriers on this aspect of self-care, even in a large managed care organization in which patients presumably have similar access to care. A number of studies attempted to compare adherence rates by ethnicity. Two studies carried out on adherence with hypertension regimens (Dunbar, 1994; Daniels et al., 1994), and one on adherence with diabetic regimens (Helman et al., 1997). The study of Dunbar (1994) did not find ethnicity to be related to adherence, while Daniels and colleagues' study (1994) looked at demographic factors such as age, education and sex among the Whites and African American, but did not make any comparison of adherence between the ethnic groups. Venter and colleagues (1991) found a relatively high rate (65 percent) of non-adherence among African American diabetics. Venter and colleagues' study drew their sample from a single ethnic minority group and made a comparison only of an adhering group with a non-adhering group on a number of demographic factors, but they were unable to compare the ethnic groups. Although there was a high rate of non-adherence within this sample, it is not known if this non-adherence rate is higher than in other ethnic groups. A study of Hellman and colleagues (1997) set out to investigate directly the relationship between ethnicity, a major test variable, and adherence, but this relationship was not found to be significant. They found gender and weight showed significant relationships to adherence.

In this study, participants who smoked reported lower adherence scores than those who did not smoke. Similarly, participants who chewed betel-nuts reported lower adherence rates than those who did not chew betel-nuts. Smoking is a serious health risk, particularly for people with diabetes. Quitting smoking is, however challenging for the smokers. Attitudes and the desire to quit are the important factors for those smokers who want to quit smoking (Haire-Joshu et al., 1994). Kviz and colleagues (1994) also pointed out that age is an important issue to be considered when planning and evaluating smoking cessation intervention. Although the younger age groups (18 to 29 and 30 to 49 year olds) have attitudes favourable to being ready to try to quit smoking as they were concerned about health effects of smoking. The oldest age group (50+ years) were more likely to plan to quit than those two age groups. Ruggiero and colleagues (1999) found that there were more individuals with NIDDM having quit, while there were more current smokers among those with IDDM. Wakefield and colleagues (1998) surveyed 223 people with IDDM aged 15 – 40 years, and found 24 percent of those were smokers. Although these smokers had higher levels of awareness that smoking increases the risk of heart disease and peripheral vascular disease, they were less aware of the risk of microvascular complications. They were less likely to quit successfully. Nearly half of the smokers had other members of the family who were smokers, and 56 percent indicated that they would expect to receive no more than little encouragement from friends and family members to quit. Many were concerned about weight gain and dietary adherence was a barrier to quitting smoking. Haire-Joshu and colleagues (1994) found the diabetic smokers whose attitudes reflected less desire to quit and less confidence in doing so, reported that cigarettes had utility in diabetes management, that quitting has negative effects on diabetes, and that significant others were perceived as only moderately supportive of attempts to quit smoking.

A use of betel-nut was found to be significant among persons born in an Asian country, typically those Bangladeshi men. This finding confirms a finding by Boreham (1999). Many betel-nut users believed that betel-nut helps strengthen teeth (personal experience with folklore) and sooth the digestion (Boucher and Mannan, 2002). Its use has a major role in many social situations (personal experience with folklore). Increased central obesity was found in association with betel-nut usage in humans, and there were also increases in circulatory markers of inflammatory and cardiovascular damage. Betel-nut contains various toxic components. For example, nitrosated derivatives of arecal alkaloids, which are carcinogenic, typically causing tumours to the upper gut and it is associated with increased tumour risk in human (Boucher and Mannan, 2002). These compounds, with some similarities to stretozotocin, are also diabetogenic in CD1 mice, causing NIDDM with obesity (Boucher et al., 1994; Mannan et al., 2000), and IDDM (Boucher and Mannan, 2002).

As recommended by Davidson (1991) and Hodgson (1989) a designed educational programme should be relevant to patients' ethnicity. So it was thought that the design of questions for self-reports for this study, especially questions concerning diet should be also appropriate to the participants' ethnicity. Therefore, Asian ingredients, foods and sweet dishes were included in questions (in self-care behaviour section) for participants who were not born in the UK (Appendix I). Clearly, there is an urgent need for an education programme for people with diabetes. Such a designed programme should also be appropriate and relevant to ethnic minority groups. Interestingly, usage of Asian utensils and foods increased understanding and improved recall in health education among the British Indo-Asians with diabetes (Hawthorne and Tomlinson, 1997). This study suggests that education programmes should include encouragement of cessation of betel-nut usage as well as cigarette smoking.

Adherence to diet, exercise and blood tests was a significantly related to treatment regimens: group1, using hypoglycaemic tablets; group 2, using insulin therapy; group 3, using both hypoglycaemic tablets and insulin therapy. Participants in group 2 were the most likely to adhere to diet, exercise and blood tests when compared to participants in group 1 and in group 1, but participants in group 1 were the least likely to adhere to diet, exercise and blood tests. This may reflect the differences in severity and complexity between the two major types of diabetes: IDDM and NIDDM, which each individual has personally perceived and experienced. Usually, a session of health education is given to a person with newly diagnosed diabetes. Patients who were diagnosed with IDDM would be prescribed insulin therapy and would, most definitely, be informed of the objective of insulin therapy and that it is a *must* for his/her own survival. Patients with IDDM may then perceive their diabetic condition being more serious than those who were prescribed to hypoglycaemic tablets. Thus patients using insulin therapy were more likely to stick to healthy eating, exercise more regularly and carry out more blood tests than those who do not perceive their diabetes as a serious condition.

With regard to the significant relationship between complications and adherence, there was a significant difference between participants with and without complications. Similarly, participants with complications may have perceived their condition being serious and believed that eating healthily, exercising more and doing regular blood tests may reduce the serious of the conditions they are experiencing. Participants who reported having a member of family with diabetes were less likely to adhere to diet, exercise and blood tests than those who did not have a family history of diabetes. A study of 154 overweight people found that those who reported a family history of diabetes perceived themselves at highest risk of developing diabetes and rated diabetes as a more serious illness, but were less likely to believe that weight loss would lower their risk (Polley et al., 1997). Participants who reported having a member this family with diabetes may perceived their diabetes as more serious, and perhaps considered themselves at greater risk of developing diabetic complications than those who did not have a family history of diabetes, which in turn, had an impact on their confidence of wanting to combat the disease.

Perception/adherence to taking tablets and insulin injections

In this study, responders were categorised by treatment. Participants were asked to report the kind(s) of medication prescribed to them by their doctors. It seemed most likely that responders who reported using diet + insulin were those patients with type 1 diabetes as well as those patients with type 2 diabetes, whose treatment with oral hypoglycaemic agents has failed (Watkins et al., 1996). Type 1 diabetes is a seriously life-threatening condition and insulin treatment is ultimately necessary survival. Type 2 diabetic patients need insulin for well-being rather than for survival. Type 2 diabetic patients who require insulin can be treated with different insulin regimes from patients with type 1 diabetes and less frequently suffer the severe blood glucose swings and hypoglycaemic problems experienced by patients with type 1 diabetes (Watkins et al., 1996). Hence, all patients with type 1 diabetes should be informed of the importance of insulin injection(s) and encouraged to undertake blood glucose monitoring. The distinctions between patients with type 1 and patients with type 2 diabetes are discussed in Chapter 4 – Lit. Review section.

There was a marked difference in acceptance between participants using tablets to treat their diabetes and those who were using insulin injections, when questions of adherence to medication were asked. Participants on lower doses of tablets were more positive about taking tablets than those on higher doses. In contrast, participants on lower doses of insulin injections felt less positive about the injections than those at higher doses. It is understandable why people were more likely to feel more positively accepting of the lower doses of tablets. A greater adherence was seen in patients on one tablet per day than those on multiple tablets (Donnan et al., 2002), or even a once daily regimen compared to those on a twice or three times daily regimen (Winkler et al., 2002), but the tendency for people on high doses of insulin injection to have more positive acceptance less clear. Presumably, it is because they were more used to the procedures or because of low survival rate among those severe diabetics who required frequent insulin injections to which they could not adjust. Karter and colleagues (2000) found that patients treated with insulin, both type 1 and type 2 diabetes, were more frequently to test their blood glucose than those using diabetes tablets.

Three factors (having no preference for a doctor's gender, having a family history of diabetes and having no complications) were significantly related to positive acceptance to utilising diabetes and blood pressure tablets. Preference for a doctor's gender seems to be a proxy for persons born in an Asian country, which was significantly associated with communication difficulties and lack of understanding of how treatments work. Such a lack of understanding through poor communication may make daily self-care practice a challenge, which in turn may reduce positive perception/adherence and confidence in those tablets. A number of studies have indicated that adherence to medication and glycaemic control would be enhanced when doctor-patient communication is improved (Greenfield et al., 1988; Uhlmann et al., 1988). Having a family history of diabetes may also be beneficial for people with diabetes. Diabetes knowledge and self-awareness could be gained through helping to look after or support a diabetic relative in the past. They could be more aware of the risk factors associated with diabetes, complications and the consequences of non-adherence, and they may thus be more receptive to advice and adhere to the recommended doses than those who did not have a family history of diabetes. It was found in this study that participants with complications have poorer adjustment to having diabetes. They were more resentful, isolated and feeling in denial of having diabetes. Thus they tended to have lower perception/adherence rate to taking tablets. Sharp and Lipsky (1999) also found that such attitudes were significantly associated with non-adherence.

In terms of perception/adherence to insulin injections, country of birth was the single independent predictor. Clearly, there was a marked discrepancy between participants born in an Asian country and those born in the UK. Asian diabetics have lower perception/adherence to insulin injections than the UK-born diabetic patients. This difference may be partially attributed to communication difficulties. Asian participants reported having lower understanding of how treatments work for their diabetes and they also reported having higher values of staff speaking and information written in their own languages. Cultural dissimilarity between health provider and patient is another consideration. Health beliefs can also be influenced by culture and religion, especially in those who educational level is limited (McAvoy and Donaldson, 1990). An example is the case of Nahkira Harris, a nine year-old West Indian child, who died after she fell into a diabetic coma (Allsop et al., 1995). Nahkira's death was blamed on her parents who were later found guilty of manslaughter for refusing to give her insulin. Nahkira's death was partially attributed to her parents' religious belief and lack understanding of treatment and communication difficulties. Insulin injections are thought to be disgraceful and unattractive by some young Asian females (personal experience with folklore). Many of those implied that they would omit the recommended doses if there were at a social event. Fasting during Ramadan is another under-researched area. It is potentially hazardous for a person needing insulin injection to omit foods, drinks or even insulin injections during daylight hours. Although this research took part during Ramadan, it is difficult to know whether the answers within this section were affected by such religious belief. This study suggests a need for more research into attitudes and practices of Indo-Asians patients with diabetes during Ramadan. British Indo-Asian community is diverse, in terms of language, religion, culture and health beliefs. An education program for British Indo-Asians should be ethnically, culturally and religiously acceptable, and most importantly it should be appropriate to their literary skill.

__Attendance to diabetes clinic/appointments__

As well as adherence to self -care and health -behaviour, attendance to diabetes clinics and appointments is also of great importance. Seventeen percent of participants were classed as non-adherent to attendance to diabetes clinic and appointments. Three factors (born in an Asian country, using betel-nut and participants whose treatments were diet + tablets or diet + tablets + insulin) independently predicted the non-adherence to attendance to diabetes clinic/appointments. Participants born in an Asian country and those using betel-nut were less likely to attend diabetes clinics. It was suggested that Friday might not be a good day for diabetes clinics for British Indo-Asians with diabetes (Hawthorn et al., 1993). On Friday many male Muslims tend to visit the mosque, while females will remain at home to pray. Communication difficulty and low literacy, both in English and Asian language, are commonly known as the predominant attributes of those with low rate of attendance at education sessions among the British Indo-Asians with diabetes (Wilson et al., 1993). Missing diabetes appointments may be also attributed to inaccessibility to a telephone and private transportation, which makes it difficult for an appointment to be rearranged. The inability to get to the diabetes clinic by many Indo-Asian females could be because they may have to travel alone. Participants whose treatment was diet + tablets or diet + tablet + insulin were more likely to miss appointments than those whose treatment were diet + insulin. Participants whose treatment was on diet + insulin may perceive their diabetes as a more serious disease and regard the attendance to diabetes clinic more highly than those whose treatment were on diet + tablets or diet + tablet + insulin. Clearly, they were keener to attend each appointment than those who do not.

Factors affecting diabetes knowledge scores

This study found that country of birth, educational level, treatment type and preferences for a doctor's ethnicity and a doctor's gender were independent predictors of diabetes knowledge level. It shows clearly that level of diabetes knowledge between the two studied ethnic groups was different. Participants born in an Asian country, participants who reported having preferences for a doctor's gender and a doctor's ethnicity, participants with no educational background and participants reported using diet + tablets to their diabetes had lower diabetes knowledge scores. It is not surprising to find participants born in an Asian country having lower diabetes knowledge scores. As reported previously, low educational background (less than five years at school) or even no education, was significantly associated with participants born in an Asian country (Asians with no educational background: 6.2% males and 71% females; Asians with less than five years at school: 35% males and 14% females). Level of educational attainment was found, within gender, to significantly influence a preference for a doctor's gender, while within the country of birth, level of educational attainment significantly influenced a preference for a doctor's ethnicity. Ninety five percent of females with no educational background and seventy four percent of females with less than five years at school reported having a preference for a doctor's ethnicity. Similarly with male participants, all males with no education and eighty percent of males with less than five years at school reported having a preference for a doctor's ethnicity. Both percentages declined as the years of education increased. With regard to preference for a doctor's gender, it was found that participants born in an Asian country than those participants born in the UK were significantly more likely to report having a preference for a doctor's gender. Among 74 participants born in an Asian country with no educational attainment, over half reported having a preference for a doctor's gender, while 21 percent of participants born in an Asian country with less than five years at school reported having such a preference. There is a similar trend for preference for a doctor's ethnicity, percentage of preference for a doctor's gender also decreased as the level of education increased. This finding was consistent with a number of studies (Hawthorn, 1997; Wilson et al., 1993). It was found by a number of studies that a large percentage of first-generation Asian women couldn't speak or understand English (Levey et al., 1986; Mello, 1992). Irving (1994) found that only 25 percent of men and 4 percent of females of Pakistani descent could read English.

Ritch et al (1996) found a large number (85 percent) of elderly Asian females who were unable to understand English. In a study in Coventry, it was found that 25 percent of Asian women interviewed could not read in any language and were totally dependent on family members for health information. Language barriers were attributed to their formal education, which is responsible for a lack of understanding of health and poor knowledge of diabetes and poor health care in people from ethnic minorities (Haywood et al., 1991; Hawthorn, 1994).

Hawthorn (1990) found that of 200 randomly selected South Asian patients attending Manchester Diabetes Centre during 1993 to 1994, 163 patients could not name any diabetic complications, 99 were unsure of the reasons for monitoring and controlling glucose concentrations, 175 did not know the purpose of attendances at the clinic to screen for early complications, and 183 did not know what a chiropodist did or how to see one. In addition, a consisting of older women with no experience of formal education, was found to have poorer diabetic control as well as less knowledge of diabetes (Hawthorne, 1997).

A number of studies demonstrated that low literacy level and inexperience of formal education did not stop patients from learning about diabetes. Hawthorn and Tomlinson (1997) utilised a combined technique in a one-to-one teaching programme using a simple educational aids like flashcards, which were specifically produced to be culturally suitable for those who had low educational background and who were unable to understand English. Within six months, this improved HbA1c levels by 0.8%, which is important clinically. Wilson and colleagues (1993) found that usage of an Asian link worker has improved understanding and the ability to care for self, as well as a reduction in morbidity for Asians with diabetes. Overland et al (1993) suggested using a low literacy reading materials with a more simple language style for those who are not fluent in reading English.

Participants whose treatment was diet + insulin or diet + insulin + tablets had higher diabetes knowledge scores than those whose treatment was diet + tablets. This may be because participants using insulin therapy had greater experience and exposure to the domain of knowledge than NIDDM patients treated with tablets. In this study it was also found that participants with higher diabetes knowledge scores had better adjustment to their diabetes and had high levels of satisfaction with the treatment compared with those whose diabetes scores were low.

Usage of unconventional therapeutic method – medicinal plants for diabetes mellitus

This study showed that thirty five percent of participants (n = 139) admitted using unconventional method for their diabetes or its complications, in combination with the prescribed medications. Almost all these participants (n = 134) reported using medicinal plants. The prevalence of medicinal plant usage for diabetes in this study is higher than those reported for users of complementary medicine for diabetes within a hospital diabetic clinic (17 percent, Leese et al., 1997), and those reported by users in Trinidad and Tobago (22 to 28 percent, Mahabir and Gulliford, 1997), but is lower than the estimated prevalence reported by users in South Texas (49 percent, Hitchcock Noël et al., 1997), those among the Mexican-American in Texas (50 percent, Marsh and Hentges, 1988), and those reported by the users of medicinal plants treatment in Thailand (68 percent, A preliminary study - Pisitchayakhon-Garnett's Thesis, 2000).

Several demographic, health and treatment, treatment satisfaction, diabetes knowledge and attitudinal variables were associated with the usage of medicinal plants in this sample. Logistic regression was used to develop a multivariate model, which indicated that *users* are likely to be those participants born in an Asian country, participants reporting having a preference for a doctor's ethnicity and participants with low knowledge of diabetes.

When controlling for other variables, no measure of having complications was found to be worse among users of medicinal plants treatment, suggesting that poorer health status did not significantly contribute to the usage of medicinal plants treatment.

Similarly, there was no difference between users and non-users in their reported satisfaction with conventional medicine, treatment, doctors and their advice. Users and non-users had similar ratings of the importance of taking care of themselves and their diabetes. Intriguingly, users of medicinal plants did not report self-care behaviour differently than non-users. This finding is consistent with earlier reports of Eisenberg and colleagues (1993), patients tended to use unconventional therapy as adjuncts to, rather than substitutes for conventional medicine, and of Hitch-Noël and colleagues (1997), whose users were the residents of small communities near Texas-Mexico border.

There were 25 different plants and 1 food/sweet (honey) reported to treat diabetes. The most commonly used traditional plant was karela. It usage was mentioned in various forms: home made fried karela (109 times), home made kearla juice (100 times), commercial karela extract (21 times) and commercial karela tablets/capsules (13 times). Karela is a member of the genus *Momordica*, which includes the more familiar cucumber, and consists of some 25 species (Tangbruranathom, 1999). It is a member of the *Cucurbitaceae* or Gourd family. *M. charantia* is used both as food and for medicinal pruposes for a variety of disorders, including diabetes mellitus. It is commonly known as karela (Hindi), parakkachedi (Tamil), susharl (Sanskrit), cundeamor (Spanish), mara (Thai), bitter gourd or bitter melon (English) and wild cucumber or wild Balsam apple (America). Karela tastes very bitter and it is believed, in terms of the Asian 'hot/cold' concept, take a *hot* substance, which is used to treat to prevent or treat *cold* diseases (Bhopal, 1986). It has widespread use in the treatment of diabetes not only in Asia, but also in Britain (Bhopal, 1986), in South Texas, America (Hichcock-Noël et al., 1997), and particularly, in Trinidad and Tobago (Mahabir and Gulliford, 1997). A number of studies have investigated fruit, leaf and seed of karela in various pharmacological forms and confirmed that this plant contains hypoglycaemic factors (Welihinda et al., 1982; Kedar and Chakrabarti, 1982; Yaqub, 1980; Akhtar and Khan, 1989; Higashino et al., 1992; Welihinda et al., 1986; Aktar, 1982; Leatherdale et al, 1986; Baldwa et al., 1977; Pons and Stevenson, 1943). However, many studies confirming its hypoglycaemic effects were through animal experiments (Welihinda et al., 1982; Kedar and Chakrabarti, 1982; Yaqub, 1980; Akhtar, 1981; Higashino et al., 1992), which cannot reliably be extrapolated to human use (Ernst, 1997). Furthermore, evidence of hypoglycaemic effects in human trials that had with poor methodological standards, e.g. conducted without controls, cannot necessarily be totally acceptable either (Welihinda et al., 1986; Aktar, 1982; Leatherdale et al, 1986; Baldwa et al., 1977; Pons and Stevenson, 1943). Two commercial karela preparations were identified by users, and costs varied. Commercially prepared karela extract (725ml) could cost up to £7 (personal experience with folklore), 2 ounce of bitter melon liquid extract could cost $12.50 and 100 capsules of commercial karela could cost $15.95 (Unknown author, 1999). It was advised that these commercial medicines should be taken together: at the beginning - two bitter melon capsules were to be taken with each meal and ½ tea spoon of bitter melon liquid extract twice daily, between meals. After three weeks, take one capsule of bitter melon with each meal, and the same liquid dosage.

The second most mentioned plant treatment was *Aloe vera*. A number of studies have investigated the efficacy of *Aloe vera* as a topical agent for wounds and burns (for example, Davis et al., 1994). Okyar and colleagues (2001) reported that *A. vera* leaf pulp extract decreased plasma glucose levels in both IDDM and NIDDM induced diabetic rats, but not in a non-diabetic model. While a study of Ghannam (1986) reported that ½ tea spoon full daily for 4 – 5 weeks reduced serum glucose levels in every patients (5 NIDDMs in total) from a mean of 233±25 mg/dL to 151±23 mg/dL with no change in body weight. However, Ghannam's study was conducted without controls. Since non-randomised trials are widely open to bias (Ernst, 1997), this evidence of effectiveness cannot possibly be acceptable for human use.

Pine forest honey was the fourth most commonly identified plant treatment. Pine forest honey is naturally derived from bees in the deep forest, and it is used mostly in hot drinks such as tea instead of brown sugar and condensed milk. A jar of Pine forest honey (200 grams) could cost approximately £3 (personal experience). A number of studies have evaluated the metabolic effects of honey in both experimental animals (Aktar and Khan, 1989) and in IDDM and NIDDM people (Shambaugh et al., 1991; Bornet et al., 1985; Samanta et al., 1985; Katsilambros et al., 1988). Aktar and Khan, (1989) found that pure natural honeys derived from the small-bee (*Apis florae*) or large-bee (*Apis dorsata*), in low dosage (i.e. 5 ml/kg body weight or less), did not produce a significant increase in glucose levels in either normal or in alloxan-induced diabetic rabbits, whereas an adulterated commercial honey, which contains higher amounts of sucrose, did. The authors finally concluded and recommended pure natural honey, in low dosage, as a source of carbohydrates and even as a sweetening agent in place of sucrose to human patients suffering from diabetes mellitus. This finding is consistent to a number of studies in human trials (Shambaugh et al., 1990; Bornet et al., 1985; Samanta et al., 1985; Katsilambros et al., 1988).

Honey, at every measurement, gave lower blood sugar readings in healthy volunteers than sucrose, provided the fewest subjective symptoms of discomfort, and was therefore recommended as a substitute for sucrose (Shambaugh et al., 1990). Honey (20g) was also found to produce an attenuated postprandial glycaemic response in normal volunteers and in patients with IDDM, when compared with sucrose (Samanta et al., 1985). It was also recommended as a valuable sugar substitute in patients with diabetes.

Usage of honey is common among Muslims. Honey was considered to be good, and most Muslims have mentioned that honey is a food recommended from the Holy Koran (Personal experience with folklore). Asian diabetics may well be taking a lot more sugar than expected by a doctor or nurse (Samanta et al., 1987). The finding of sweet herbal agent in this study was not inconsistent with findings in Leicester (Samanta et al., 1987). It should not be of great concern if such high usage of sugar, in forms of brown sugar, sucrose or condensed milk, is replaced by Pine forest honey.

Nim was the sixth most mentioned traditional plant treatment for diabetes (commercial karela extract was the fifth most mentioned treatment and was discussed above). There is not much scientific evidence on hypoglycaemic effects of Nim or Neem (*Azdirachta indica*). Only one study was found in a mesh Medline search from 1970 - to date. Khosla (2000) found administration of nim leaves extract or seed oil for 2 weeks reduced blood glucose levels in alloxan-induced diabetic experimental animals, and prevented the rise in blood glucose levels in normal experimented animals. Its hypoglycaemic effect was comparable to that of glibenclamide. This study indicates an urgent need for a rigorous evaluation of nim leaves' efficacy preferably through a randomised controlled trial (Ernst, 1997), though the use of nim was not as high as karela. Several patients reported using pre-packaged herbal mixtures sold under names such as 'Bhadraphash', which can be purchased while visiting homeland (India). Consultations with hakims were generally by persons with chronic illnesses while visiting homelands (Bhopal, 1986). Clearly, it is difficult to evaluate such mixed herbs as there are, obviously various forms or types of herbs/plants included in a mix. There is a great concern about the safety of traditional remedies, which are advertised and sold without their efficacy being rigorously evaluated and that health-care practitioners should caution patients against mixing hypoglycaemic plants and pharmaceutical drugs

(Atherton, 1994; Sanders et al., 1995; Shaw et al., 1998; Cirigliano and Sun, 1998; Fugh-Bermah, 2000). Medicinal products derived from herbs and/or plants should also be licensed like medicines so that they can be screened for the constituents, quality and level of potentially hazardous constituents (De Smet, 1995; Shaw, 1998). Thus only those with effective and safe ingredients should be offered to consumers.

It was found that the 'reputable' effects of these medicinal plants treatment were best discovered by 'a word of mouth', typically via a friend with diabetes living within the community. This may reflect the frustrations and desperations for a cure within this ethnic community. It was also found that only 17 percent of users revealed their usage of medicinal plants treatment to their doctors. Fear of disapproval and the belief that Western doctors were neither knowledgeable nor interested in Asian medicine seemed to be the overriding factors in this lack of communication (Bhopal, 1986).

This study agrees with Bhopal's view (1986) that Asian medicine is likely to decline in view of the low interest of such medicine knowledge among the younger Asian - generations, especially those born in the UK. Nonetheless, in view of the language barrier, as reflected in a significant difference in terms of having a preference for a doctor's ethnicity between users and non-users, it is conceivably that usage of Asian medicinal plant treatment may endure. Increasing barriers to care such as waiting list and appointments system (Anonymous, 1984) and the rival of 'unconventional therapeutic therapy' (Sharma, 1992).

Summary

This study indicates a marked tendency for them to be barriers based on communication difficulties and cultural differences between the British Indo-Asian diabetic patients and their western health care professionals. Communication and culture seem to be also the predominant issues towards understanding, and care of diabetes. Gender, monthly income, using of betel-nut and dissatisfaction with orthodox treatment and health care providers independently predicted use of medicinal plants as an additional treatment diabetes among this ethnic minority group. The British Asian community is a diverse group, it comprises a diversity of cultures, religions, health beliefs, social class, politics, languages and many other factors such as its individual backgrounds/characteristics. It seems not sensible to suggest that any of these as a single factor causes difficulties and usage of medicinal plants within this group. Cultural and religious factors are likely to influence health beliefs and attitudes to care of an individual who was not formally educated, who is having language difficulties and who is unfamiliar with the western health care system. However, this may be minimised if communication and cultural barriers were overcome or bridged through a use of bilingual advocate. Knowledge and information emerged here, is not enough to improve health-care delivery, but it can create awareness of a range of factors to be taken into account when planning provision, e.g. a diabetes education program, to be culturally and appropriately specific to this group.

CONCLUSION

The study sets out to identify factors which influence non-adherence and trigger British Indo-Asian patients with diabetes mellitus to use unconventional therapies such as a medicinal plant treatment. Three psychological measurements and one basic diabetes knowledge scale were developed to assess the extent to which of these components might mediate adherence and use of medicinal plant treatment: (1) psychological adjustment to having diabetes (PAD16), (2) treatment satisfaction (TSF16) and (3) self-care behaviour/adherence (diet, exercise, blood tests, medication, and attendance to diabetes clinic appointments), and (4) basic diabetes knowledge questions (BDKQ). This chapter summarises the research findings concerning factors associated with non-adherence and predictors of users of medicinal plant treatment.

With regards to psychological adjustment to having diabetes, using betel-nut; treatment involving insulin; having a family history of diabetes; having a preference for a doctor's gender; having complications and having higher BMI were associated with poor adjustment to having diabetes. These effects are independent of being born in an Asian country and having low income, factors which were associated with relatively poor adjustment to having diabetes. During the interviews, many participants, especially those born in an Asian country implied that they felt as being sentenced to having the disease. Many mentioned that the disease was given to them because did wrong religiously, while some suggested absence of sweating (due to cold weather) and eating sweet things as the cause of diabetes. Many felt unclear about the cause of the disease and the recommended western medication. Many British Indo-Asian females are unused to being with a male company and many of them expressed having a preference for a doctor's gender. British Indo-Asians of both sexes, in this study, if they had low educational background or were old, were the most likely people to express having a preference for a doctor's ethnicity. This is most probably linked with the value of communication in their own language rather than just for a cultural similarity. Many British Indo-Asians with diabetes depend on a family member to overcome communication difficulty and involved a family member when attending diabetes clinic appointments. However, using of non-professional interpreter cannot always be beneficial, especially when it involves a young child (Baylav, 1996).

People with a low income were also likely to have poor adjustment to having diabetes. Low income was significantly related to level of educational background and, in this study, it was found to be significantly associated with people born in an Asian country. Apart from a genetic factor, deprivation is suggested to be one of the causes of the high prevalence of NIDDM among the British Indo-Asians (Kelly, et al., 1993). Eachus and colleagues (1996) found that people with diabetes living in a deprived area have a higher risk for diabetes complications than those living in an affluent area. This could be due to a combination of factors, which impose barrier to adequate care among low-income groups.

In summary, the psychometric properties of the PAD16 scale were examined and it was shown to be reliable in this study. Various factors were found to influence the attitudes of people toward their diabetes. It seems that poor adjustment to having diabetes is mostly associated with low income, who were born in Asian countries, as well as those who reported having complications, higher BMI scores, a family history of diabetes, using insulin treatment, using betel nut and having a preference for a doctor's gender.

There are steps to be taken to improve the attitudes of people to their diabetes, one of which is to increase the understanding of diabetes, its symptoms and self-care. The use of health advocates may improve access to available services and self-care programmes and so heighten awareness and the distribution of information about diabetes and its self-care in British Indo-Asians with diabetes.

To be culturally fair, the interview developed for this study mention of included regularly eaten Asian foods and sweet dishes in the section on adherence to diet, exercise and blood tests. However, it was found that people from the Indo-Asian group had poorer adherence to diet, exercise and blood tests than those who were born in the UK. They also reported lower levels of understanding of how prescribed treatments work, and they had lower perception/adherence scores for taking medication, and attendance at diabetes clinic appointments.

Being born in an Asian country was the only independent predictor of non-adherence to insulin injection. Five out of seven predictors of non-adherence to diet, exercise and blood tests (having a preference for a doctor's gender, using betel-nut, having complications and reported having a family history of diabetes) were significantly associated with people born in an Asian country. Three predicted factors (having a preference for a doctor's gender, reported having a family history of diabetes and having complications) of non-adherence to taking tablets were also significantly associated with being born in an Asian country. Two out of three predictors (being born in an Asian country and using betel-nuts) of non-adherence to attendance to diabetes clinic appointments were significantly associated with people born in an Asian country. This study suggests that a combination of communication difficulty and cultural belief is influencing health care behaviour in people with diabetes who belong to an Indo-Asian community.

Successful management and control of diabetes and its complications requires, at least, a basic knowledge of diabetes. Measuring diabetes knowledge is critical as it is thought to be independently associated with diabetes control (Bradley, 1996). A newly diagnosed diabetic should, in general, be fully informed of the principles of self – management. Clearly, British Indo-Asian people with diabetes, in this study, were significantly less knowledgeable about diabetes than those UK-born people with diabetes. Three out of four significant predictors (being born in an Asian country, having low educational background, having preferences for a doctor's gender and for a doctor's ethnicity) were significantly associated with people born in an Asian country.

Users were likely to be those participants who were females, having low monthly income, using betel-nut, having low treatment satisfaction and adherence scores. These variables were all independently associated with the usage of medicinal plants in this sample. There were, however, interdependencies between the effect of diabetes knowledge on the medicinal plant usage, and the effects of country of birth and having preferences for a doctor's ethnicity.

Apart from being born in an Asian country and having a preference for a doctor's ethnicity, poor basic diabetes knowledge scores also significantly predicted users of medicinal plant treatment. Poor basic diabetes knowledge was significantly associated with to low educational background, a factor, which in turn was significantly associated with people being born in an Asian country.

Usage of medicinal plants was very much related to a poor understanding of diabetes and its cause. Usage of medicinal plants may be partially attributable to cultural influence, but it is most likely due to communication difficulties that trigger people to search for an additional treatment. To either cure the disease or ease diabetic complications; this needs further research, particularly beliefs towards the efficacy of medicinal plants in treatment.

Clearly, the British Indo-Asians with diabetes have a variety of barriers to successful self-management when compared with the Caucasians with diabetes. The British Indo-Asian community is complex. It seems, somehow, as a single community, but at the same time 'Indo-Asian people' symbolizes a variety of individuals grouped together in their own communities that are all fundamentally dissimilar in terms of language, health beliefs, culture, religions, politics, social classes and many other factors.

The conclusion from the study is that there are significant associations, implying that the British Indo-Asians with diabetes, whose languages, cultural background and religious beliefs differ from the UK-born diabetics, experiencing communication difficulties and feeling isolated, displayed poorer knowledge of diabetes, adherence scores and dissatisfaction with the health care they are being offered and turn to the use of traditional medicinal plants to treat their diabetes.

CHAPTER FIVE

DISCUSSION

This chapter discusses the findings from the two studies. The first part of this chapter discusses what is known about the usage of medicinal plants for diabetes: characteristics of users of medicinal plants; factors prompting the use of medicinal plants; and association between using medicinal plants and dissatisfaction towards conventional treatments, medicinal or services provided by NHS. Such discussion will be done separately between the two different ethnicities: (1) Thai participants born and living in Thailand and (2) participants born in an Asian country and resident in the UK (British Indo-Asians), and will be carried out against issues identified through the literature review. Details of medicinal plants used and the effect of adherence to conventional treatment regimes to usage of medicinal plants are fully discussed and covered in chapter 3 and chapter 4 (see discussion). The final part of this chapter discusses the limitations of these two studies.

USAGE OF MEDICINAL PLANTS FOR DIABETES MELLITUS

The studies in this thesis found that medicinal plants were more frequently used by Thai patients with diabetes (68 per cent) than by British Indo-Asian patients with diabetes (35 per cent). Both rates are higher than those reported for users of complementary medicine within diabetes clinics in the UK (17 per cent, Leese et al., 1997), and for users of alternative treatments in a national survey of English speaking adults (34 per cent, Eisenberg et al., 1993). However, the rate of medicinal plant users for diabetes in England is less than those reported for users of bush medicines in Trinidad and Tobago (42 per cent, Mahbir and Gulliford, 1997), for South Texas diabetic outpatients (49 per cent, Hitchcock Noel et al., 1997), and both rates discovered here are even less than that reported by Reawpibol (1991) (84 per cent). Most users (93 per cent of Thai users and 60 per cent British Indo-Asian users) admitted using medicinal plants for their diabetes or its complications, in combination with the prescribed medicine on a daily basis.

There were over 50 kinds of medicinal plants mentioned by users in Thailand and 25 kinds of herbal preparations mentioned by the British Indo-Asian users. One characteristic that the two groups of medicinal plant users had in common was that they would rather not inform the doctor or other health care professionals of the usage of this additional form of medication. This despite an encouragement to bring back the usage of medicinal plants for various illnesses in Thailand in 1988 as a safe and cheap alternative to pharmaceuticals (LeGrand et al., 1993). Only 14 per cent of Thai medicinal plant users and 16 per cent of British Indo-Asian users were willing to discuss the usage of this form of medication with their doctor and/or health care providers. This reflects quite distinctive ideas and expectations about treatments and consultation between patients and health care providers. Patients may believe that doctors and/or health care providers were not approve the usage of non-orthodox treatment, so they would prefer to keep it secret. This incidence is similar to that found by DeSmet (1997). The majority of herbal remedy users were self-prescribed and many individuals may be reluctant to tell their general practitioners. Many herbal remedy users perceived herbal preparations as natural and therefore 'safe' (Newall et al., 1996). This, however, is a misconception – herbal remedies can produce adverse drug reactions (ADRs) (Abbot et al., 1996; Barnes et al., 1998). Therefore, it is not surprising that a high proportion of herbal remedy users would not consult their GPs or pharmacist following an ADR to conventional over-the-counter medicines (Barnes et al., 1998).

Various sources of information were mentioned in both studies. Private sources, e.g. from a friend who either has or knows someone with diabetes, were most frequently mentioned. A high percentage of British Indo-Asian medicinal plant users (96 per cent) reported that they were very happy to recommend the usage of this additional treatment to other diabetic patients. As such question was not used in study 1, it was not possible to make any comparison of medicinal plant treatment satisfaction between the two studies.

What kind of people using medicinal plants to treat diabetes?

In study 1, the typical *users* of medicinal plants were likely to be those with low diabetes knowledge scores. Whereas *users* in study 2 showed broader characteristics. The users were likely to be those female participants reporting having low monthly income, using betel-nut, having low treatment satisfaction and adherence scores. There were also interdependencies between the effect of diabetes knowledge on the medicinal plant usage, and the effects of country of birth and having preferences for a doctor's ethnicity in study 2. This indicated that participants born in an Asian country were most likely to have reported having preferences for a doctor's ethnicity and have had low diabetes knowledge scores, and were most likely to be users of medicinal plants for their diabetes and/or diabetes complications.

In these studies, the majority of female participants, both Thai (13% with no education and 71% with primary school level) and Asian (70.8% with no education and 13.5% with primary school level), had either no or low educational background (primary school level). Gender significantly influenced the level of educational attainment, and such educational attainment significantly mediated the performance of both attitudinal and diabetes knowledge scales in study 1. However, age, gender and country of birth independently predicted educational level, and such educational level significantly influenced the performance of diabetes knowledge scale but not the attitudinal scale in study 2. The results of these studies were similar to those of Mahabir and Gulliford (1997) who found that educational background was one of many factors that influenced the selection and use of bush medicine in Trinidad and Tobago. Usage of bush medicine was more frequent in Afro-Trinidadians and in those of mixed ethnicity than in Indo-Trinidadians, and was more prevalent in those with low educational background (Mahabir and Gulliford, 1997).

Not surprisingly, there was a strong relationship between income and employment status in both studies. Since the mean age of the participants was 55 years in study 1 and 59 years in study 2, it is not surprising that many were pensioners and many had a monthly income in the range of £1 to £500. In both studies, educational levels also predicted income. Females from both sample groups had lower educational attainment and income than males. Females were the *typical* users of medicinal plant in study 1. Most national surveys, both in Britain and in other Europe countries, also indicate a slightly greater number of women among users of unconventional therapeutic methods than men (Sermeus, 1992). There are, however, markedly different characteristics between the users found here and those documented in Sermeus's (1992) study where the majority of female European users were mainly from higher educational attainment, income and socio-economic groups than the users of these two studies.

In study 2, using betel-nut was an independent variable predicting use of medicinal plants for diabetes. Not surprisingly, there was a strong relationship between using of betel-nut and country of birth since all participants (n = 28) using betel-nut were those born in an Asian country, of which 24 were born in Bangladesh. Asian folklore believes that chewing betel-nut strengthens teeth (personal experience with folklore). Betel-nut users were predominantly male (75 per cent). It was reported that they had used betel-nut for between 11 and 55 years (mean = 34 years), and that they used between 2 and 6 betel-nuts per day (mean = 3.6).

Betel-nut contains nitrosamines with some chemical similarity to streptozotocin, a nitrosamine used to induce diabetes in experimental animals (Boucher et al., 1994). Boucher showed betel-nut as a contributor to the onset of impaired glucose tolerance and diabetes in animals. However, its role in the aetiology of diabetes in humans is still in dispute.

There were also interdependencies between the effect of diabetes knowledge on medicinal plant usage, and country of birth and having preferences for a doctor's ethnicity in study 2. This indicated that participants born in an Asian country were most likely to have reported having preferences for a doctor's ethnicity and have had low diabetes knowledge scores, and were most likely to be users of medicinal plants for their diabetes and/or diabetes complications.

Country of birth was a powerful predictor for preference of a doctor's ethnicity. This indicates the values of communication in British Indo-Asian participants' own language. Many participants within the British Indo-Asian group reported wanting to have health care providers speaking Asian languages and involved a companion in appointments. This suggests a problem compared with the majority of the UK-born population (Shillitoe, 1988). It is thought that lack of knowledge about diabetes and self-management of the disease can be attributed to language difficulties among this group (Wilson et al., 1993). Fowler et al (1987) discovered that patients who were much fluent in English had better self-care management than those with language difficulty. In fact, medical staff often perceived cultural differences and communication difficulties as barriers to better adherence (Hjelm et al., 1998). Nevertheless, using a family member, especially children, as an interpreter cannot be totally accepted. The literature review indicated that the provision of more bilingual health advocates who actually derive from the same community and culture as the patients may resolve this problem (Baylav, 1996).

Country of birth, preference for a doctor's ethnicity and educational level were independent predictors of diabetes knowledge level in British diabetic participants. Participants born in an Asian country and participants who reported having a preference for a doctor's ethnicity had lower diabetes knowledge scores. Not surprisingly, low educational background (less than five years at school) or even no education was significantly associated with being born in an Asian country. Level of educational background significantly mediated a preference for a doctor's ethnicity, and the trend for this preference decreased as the level of education increased. This finding was consistent with a number of studies (Wilson et al., 1993; Hawthorn, 1997). Large percentages of first generation Asians, especially females, were unable to understand English, and so depended on family members for health information (Ritch et al., 1996).

A study in Manchester found that of 200 randomly selected South Asian patients attending a Diabetes centre, 82 per cent could not name any diabetic complications, almost half were unsure of the reasons for monitoring and controlling glucose concentrations, 88 per cent did not know the purpose of attendances at the clinic to screen for early complications, and 92 per cent did not know what a chiropodist did or how to see one (Hawthorn, 1990). As previously discussed, communication barriers among this ethnic group stemmed from Asian participants' formal education, which is responsible for a lack of understanding for good self-care practice. Hence there is poor diabetes knowledge and health care in people from ethnic minorities (Haywood et al., 1991). There is, however, a demonstration that low literacy and inexperience of formal education did not prevent patients from learning about diabetes when suitable and simple techniques and facilities were utilised (Hawthorn and Tomlinson, 1997). Utilising a combined technique, e.g. using flashcards made to suit their cultural background, in a one-to-one teaching programme, improved glycaemic levels of British Indo-Asian diabetic patients by 0.8 per cent within six-month period. Usage of an Asian link worker also proved to be beneficial to the British Indo-Asians with diabetes. It not only improved their understanding of self-care management but also reduced morbidity for Asians with diabetes (Wilson et al., 1993). It indicated that a well-trained Asian link worker could bridge the gap between patient and doctor in terms of cultural differences (Gillam and Levenson, 1999). Similar to study 1, many British Indo-Asian patients who were using medicinal plants to additionally treat their diabetes and its complications were less willing to inform their health care providers of their medicinal plant usage. They may, however, feel more comfortable in speaking to the link worker so a link worker could forward facts of plant usage to such patients, e.g. that medicinal plants could interact with hypoglycaemic drugs (see Literature Review in chapter 4).

Why do people use medicinal plants to treat diabetes?

Answering the question 'Why do people with diabetes use medicinal plants to additionally treat diabetes and its complications?' may point to dissatisfaction with orthodox medicine, especially since orthodox services may cost less. As discussed earlier, as with all decision making relating to health care, the decision to use medicinal plants is influenced by a range of factors.

Both studies found that patients who use medicinal plants to treat their diabetes and its complications tend to be older females of no or low educational background and income, and most frequently reported by patients born in an Asian country (British Indo-Asians). These findings are similar to one conducted in a middle-income country, Trinidad and Tobago (Mahbir and Gulliford, 1997). Mahbir and Gulliford (1997) suggested that utilization of medicinal plants for diabetes in this country was part of a shared culture. Trinidad and Tobago comprises a range of ethnicities: Spanish;

immigrants from English colonists from West Africa and Indian subcontinent; and Venezuela and Eastern Caribbean islands (Brereton, 1981) and, hence various cultural influences.

Most national surveys on usage of unconventional therapeutic methods, both in Britain and in other Europe countries, as previously discussed, covered more types of unconventional therapeutic methods used to treat, mainly, chronic illnesses and conditions. Most British and European users of unconventional therapeutic methods are females (Sharma, 1992), who were unsatisfied with orthodox treatments, but were able to afford private medicine. However, this does not seem to be the case among Thai medicinal plant users. On treatment satisfaction scores, there was no statistically significant difference between users and non-users of medicinal plants by the Thai participants. Thai medicinal plant users were as satisfied with orthodox doctors and treatments as those non-users, and would prefer orthodox treatment if it was available to them in terms of cost and accessibility. National Health Systems in Thailand markedly differ from the one offered by the British NHS. There is a newly introduced medical strategy in Thailand, e.g. 'good health at low cost' for most acute illnesses (see chapter 3). However, medication costs, typically for chronic diseases, remain a burden to many patients in Thailand, especially those of low-income groups. For this reason, it is understandable why medicinal plants and other unconventional therapeutic methods are still prevalent in Thailand.

It is documented that the Thai government encouraged the use of herbal medicine as a safe and cheap alternative to pharmaceuticals (LeGrand et al., 1993). Herbal medicines were proved to be safe and effective in treating acute conditions, i.e., common cold or aches and pains, in the villages of Thailand. Many commercially prepared medicinal plants, for example *Momordica charantia* tablets/capsules, were sold as alternative hypoglycaemic agents in a hospital in Thailand (personal experience while conducting study 1). However, diabetes is a chronic life-threatening condition that requires close medical care and monitoring. Incorrectly treated or neglected diabetes causes major malfunctions in most of the important body systems, leading to serious complications. For instance, type 1 diabetes depends solely on insulin injections in order to survive, though use of medicinal plants is prevalent in Thailand. Only a small number of reputed plants have been rigorously evaluated medically (see chapter 1 and chapter 3). *Momordica charantia* proved to have positive hypoglycaemic activity in both experimental animals and human trials, and it could also interact with other hypoglycaemic tablets, e.g. glibenclamide (Leatherdale, 1981). However, many procedures in such trials are still in dispute (Ernst, 1997). Therefore, it is unethical to recommend such plants to patients.

Similar to European unconventional therapeutic methods, British Indo-Asian medicinal plant users turned to unconventional therapeutic method because of dissatisfactions with conventional medicine. Treatment satisfaction was one of the independent predictors of medicinal plant users in study 2. There were, however, dissimilarities between the British Indo-Asian medicinal plant users and the European users of unconventional therapies. British Indo-Asian users were much lower in educational background and socio-economic level, but they were much older than the European users of unconventional therapies. This could explain why self-medicating and home-prepared medicinal plants were prevalent among the British Indo-Asian users. There are some indications that dissatisfaction with conventional medicine does not necessarily predict use of unconventional therapeutic methods (Astin, 1998). Patients seem to have similar view about the perceived efficacy of conventional and unconventional medicine (Vincent and Furnham, 1994). Medicinal plants used, medicinal plant users in study 2 were asked if they would recommend this usage to anyone with diabetes. Almost all users (96 per cent) reported that they were happy to recommend such usage to other diabetic patients. This indicates a belief/perception in these patients that medicinal plants are effective in treating their diabetic problems.

Patients were even more likely to perceive benefit from unconventional therapeutic method if they had longer duration of diabetes and had used such treatment regularly and for longer period of time (Leese et al., 1997). Not only health care users, but many interviewed British and European doctors (GPs) also perceived some unconventional treatments to be useful and efficacious (Wharton and Lewith, 1986; Verhoef and Sutherland, 1995; White et al., 1997; Knipschild et al., 1990; Reilly, 1983), especially for treating chronic pain, and that such treatments should be funded by the NHS (White et al., 1997), or licensed and regulated by the Department of Health and Social Security (Wharton and Lewith, 1986).

Both Thai and British Indo-Asian users had lower mean scores on attitudes towards having diabetes than non-users. They viewed having diabetes as a burden and were less well adjusted to their diabetes than non-users of medicinal plants. As previously discussed, diabetes knowledge scores were the only significant predictor of usage of medicinal plants in Thailand. Thai medicinal plant users had lower mean scores on diabetes knowledge questionnaire than non-users of medicinal plants. Adherence was another independent variable distinguishing British Indo-Asian users from non-users of medicinal plants for diabetes. This factor is fully covered in the Discussion section of chapter 4.

Limitations of research and confounding factors

Study 1. Usage of medicinal plants for diabetes in Thailand

In the development of this research there are limitations and potential confounding factors:

- **The Diabetes Knowledge questionnaire proved to be too difficult for Thai participants.** The failure of the questionnaire, especially the DKN may be largely attributed to an extreme lack of formal educational background of Thai participants. There are words that many Thai participants might or might not be familiar with, but did not understand their meaning. They did not know what 'insulin' or 'ketone' were, and could not link protein with any of their typical dishes. Moreover, many questions in the DKN were unsuitable for the people with diabetes in Thailand. In Thailand, margarine or butter is simply not commonly used in Thai dishes, and many older participants did not know what they were or were for. Findings concerning Diabetes Knowledge Questionnaire in the Chai Nat sample needed to be interpreted very cautiously. Hence a redesigned scale of Basic Diabetes Knowledge Questions was used in Study 2. Further research of the Basic Diabetes Knowledge Questions scale in health authorities in Thailand would be useful to assess this scale and any bias.

- **The research could only focus on one hospital.** The participating hospital (Chai Nat Hospital) is a typical *inner* town health authority. It serves a population living in and around the area. However, validation of the research findings by applying the research tool to another health authority was seen as adding validity and providing a benchmark capability. There is, therefore, a reason to believe that conclusions drawn from this study are broadly representative of Thai participants with diabetes at this time.

Study 2. British Indo-Asians with diabetes: their adherence and use of medicinal plants for diabetes

In the development of this research there have been a number of limitations and potential confounding factors:

- **Low responses to initial letter invitations and constant change of contact address and telephone numbers.** Potential participating patients were randomly selected and contacted, initially by letter from a researcher with an attached letter from his/her doctor inviting participation in this study. The response to this was low, the majority being from the British Indo-Asian ethnic groups. Second letters, accompanied by a letter from his/her doctor were sent before personal telephone calls were made. An Asian link worker (interviewer) was asked to contact those with Asian names and/or surnames. Changes of telephone numbers were commonly experienced, mainly among the ethnic minority group. Personal contact through door canvassing was the last attempt. Then the new group of participants was randomly selected to replace the ones that could not be traced. Although the initial phase of recruitment was by random selection - which helps ensure an unbiased sample - the low response rate means that it is possible that bias was introduced by certain kinds of people excluding themselves. It seems quite plausible that self-exclusion would be most common with people who have communication difficulties or are dissatisfied with the health care they are being offered. Nonetheless, these recruitment procedures probably reduced the problem to a minimum.

- **The research took place over the period of Festival of Light and Ramadan.** Collecting data during this period may have influenced the attitudes of many participants who were Muslim followers because of their heightened religious awareness at the time. These festivals seemed to increase the number of cancellations, but having an Asian link worker seemed to lessen this problem. This study recommends further research to measure British Indo-Asian diabetics' understanding of the importance of diabetic control during this festive season.

- **The research took place during disturbances between Asians and white British in Oldham and subsequently there were considerable feelings of discrimination and mistrust and threatening thoughts, especially towards the health care authority.** Many older participants, especially Asian-born, were very frightened to go out on their own, including a trip to the diabetic appointment, and felt intimidated in their own homes. This, they said, caused a massive impact in the ways in which they thought about their illness. However, having an Asian link worker seemed to lessen the impact of the disturbances on the quality of the data.

CHAPTER SIX

CONCLUSION

The research program outlined in this thesis was designed to identify factors which influence patients with diabetes mellitus to use unconventional therapies such as medicinal plants either in conjunction with or instead of conventional medicine in two different settings: in Thailand (study 1) and in the UK (study 2). Study 1 set out to evaluate usage of medicinal plants in Thailand. A set of well-known questionnaires, that seemed to have worked well with various groups of European people, notably with formal educational background, were used in this study. They were translated (and back-translated by a different translator) as suggested by the developers. A face-to-face interview technique was employed and seemed to have work well for this group. Rejection rates and incomplete answers were low. The 19-item attitudinal scale was reliable (the alpha value = .96). For the 8-item satisfaction scale, Cronbach's alpha was low (alpha value = .56). The failure of some items in the Diabetes Knowledge Scale was partly due to the extreme lack of formal educational background in the Thai participants. In addition, difficulties arose from cultural differences. For example, cooking ingredients mentioned in the scale are not used in Thai cooking. Sixty eight per cent of participants admitted that they used medicinal plants to treat diabetes and its complications in combination with prescribed orthodox medicines. It seems to be economic issues rather than dissatisfaction with orthodox treatments that influence the decision to usage of medicinal plants among the Thai users. Users in Thailand had similar perceptions and faith in conventional treatment and medicine as those non-users of medicinal plants. However, typical users had significantly lower diabetes knowledge scores than non-users of medicinal plant. This is partly attributed to their low educational background. The users identified over fifty medicinal plants. However, it is a concern that many of these plants have not been rigorously evaluated scientifically or medically. Many plants (see chapter 3 and 4) could interact with some hypoglycaemic medicines. Most users indicated their satisfaction with the medicinal plants by reporting that they were happy to recommend such usage to anyone with the same condition. Almost all users used some kind of medicinal plants to treat diabetes and its complication(s) on a daily basis. Despite an encouragement from the Thai government to bring back the use medicinal plants as a safe and cheap alternative to pharmaceuticals, only a small number of users were willing to reveal this additional usage to their orthodox health care providers. The knowledge of plants' beneficial properties is generally passed down through the generations and is shared within and around the community. The use of medicinal plants may not be as prevalent in the big cities of Thailand, e.g. Bangkok, as those remote areas, where accessibility and affordability are issues of concern.

The question of why British Indo-Asian patients with diabetes turn to medicinal plants when they could use the national health services for nothing is examined and discussed. It is believed that a set of questionnaires used in study 1 might not be culturally suitable for this group of participants. Similar to the Thai participants in study 1, British Indo-Asians with diabetes in study 2 mostly had low educational background and income. The British Indo-Asian community is a diverse group. It comprises populations from different backgrounds in terms of ethnicity, culture, religious beliefs and perceptions. Three psychological measurements and one basic diabetes knowledge scale were developed to assess the extent to which of these components might influence adherence and use of medicinal plant treatment: (1) psychological adjustment to having diabetes (PAD16), (2) treatment satisfaction (TSF16) and (3) self-care behaviour/adherence (diet, exercise, blood tests, medication, and attendance to diabetes clinic appointments), and (4) basic diabetes knowledge questions (BDKQ). Based on a similar principal to ATT19, PAD16 contained five psychological concepts: coping, convicted feelings, uncertain feelings, and guilt and diabetes stress. PAD16 was reliable for the sample in study 2 (alpha value = .99).

Participants who reported using betel-nut; whose treatment involved insulin; having a family history of diabetes; having a preference for a doctor's gender; having complications and having higher BMI, had poor adjustment to having diabetes. These effects are independent of being born in an Asian country and having low income, factors that associated with relatively poor adjustment to having diabetes. During the interviews, many participants, especially those born in an Asian country suggested that they felt as being sentenced to having the disease. Many believed that diabetes was given to them as a punishment from God, while a few suggested absences of sweating (because they lived in the UK) and eating sweet things as the cause of diabetes. Many felt unclear about the cause of the disease and the recommended western medication. Some British Indo-Asian females do not feel comfortable being examined by a male doctor and preferred to see a female doctor instead. Both male and female British Indo-Asians, who had low educational background or were old, expressed having a preference for a doctor's ethnicity. This indicates rather the value of communication in their own language than just a value for cultural similarity. Some British Indo-Asians with diabetes rely on a family member to overcome language difficulty and involved a family member when attending diabetes clinic appointments. In fact, using of non-professional interpreter, especially a young child is far from ideal. Use of a link worker, a non-medical professional from the similar cultural and religious background, is becoming popular in many medical services, as it proved to bridge the cultural gap between health care providers and health users.

People with low income had poor adjustment to having diabetes. Low income was significantly related to level of educational background and both factors were significantly associated with people born in an Asian country.

To make the adherence questionnaire suitable to this sample, typical Asian dishes were mentioned in the section on adherence to diet, exercise and blood tests. People born in an Asian country had poorer adherence to diet, exercise and blood tests than those of participants born in the UK. They also reported lower levels of understanding of how prescribed treatments work, and they had lower perception/adherence scores for taking medication, and attendance at diabetes clinic appointments. People born in an Asian country were unlikely to adhere to diet, exercise and blood tests. Most worryingly, these people were less likely to adhere to taking tablets and to insulin injection than those born in the UK. They were also likely to miss diabetes clinic appointments more often than those participants born in the UK. This study suggests a combined language difficulty and cultural belief as mediator to good health care behaviour management in people with diabetes who belong to an Indo-Asian community.

Clearly, British Indo-Asian people with diabetes were significantly less knowledgeable about diabetes than those born in the UK. Three out of four significant predictors (being born in an Asian country, having low educational background, having preferences for a doctor's gender and for a doctor's ethnicity) were significantly associated with being born in an Asian country.

Gender, monthly income, betel-nut usage, and treatment satisfaction were independent predictors of medicinal plant usage in the UK sample. There were also interdependencies between country of birth, preference for a doctor's ethnicity and DKN, as predictors of users of medicinal plant treatment. This indicated that participants with poor diabetes knowledge scores were likely to be those born in an

Asian country, and these people were most likely to be users of medicinal plant treatment. Usage of plants in this study is influenced by a number of factors.

Similar to many European users unconventional therapies, British Indo-Asian medicinal plant users turned to this treatment because of dissatisfaction with conventional medicine. However, British Indo-Asian users were much lower in terms of educational attainment and socio-economic level, but were much older than the European users of unconventional therapies. This may explain why self-medicating and home-prepared medicinal plants were common among British Indo-Asian users. Patients perceived benefits of medicinal plant treatment and were happy to recommend such usage to other diabetic patients. This research suggests that use of medicinal plant for diabetes may also be partially attributed to cultural influence, but it is most likely due to language difficulties that trigger people to search for an additional treatment to either cure the disease or ease diabetic complications; this needs further research, particularly beliefs towards the efficacy of medicinal plants in treatment.

The conclusion from the research is that Thai medicinal plant users still prefer orthodox medicine, but what they actually use in the event of illness will depend on what is available to them in terms of cost and accessibility. In contrast, usage of medicinal plant in the UK is significantly influenced by dissatisfaction with the health care they are being offered. It seems that, broadly, medicinal plant users are those who are culturally most close to their Asian origins and most distant from the culture of their host country.

Further issues for research

This research illustrates the concerns of British Indo-Asians with diabetes using medicinal plants to treat diabetes. The characteristics of these typical *users* were females; who had low monthly income; reported having a preference for a doctor's ethnicity; and had low satisfaction and adherence scores. Health providers should be aware of this usage. This research recommends:

(1) the provision of integrated range of support services appropriate to the specific cultures, religions and languages of British Indo-Asian communities. Support teams should include dieticians, diabetes nurses, community workers, interpreters and Asian link workers who are fluent in the appropriate language(s), and familiar with the cultural and religious beliefs of the target group;

(2) educational programmes to increase British Indo-Asians' understanding of diabetes, its symptoms, available care, and understanding of effectiveness and dangers of using medicinal plants. An Asian link worker should increase the effectiveness of these programmes and;

(3) availabilities of clear health information and guidelines on service standards in a number of languages.

Further research to measure British Indo-Asian diabetic patients' satisfaction and understanding of diabetic health services after an educational programme would strengthen the analysis. This should incorporate the views of both patients and their health providers.

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British Indo-Asians with Diabetes Mellitus: Their adherence and use of medicinal plants

Volume II

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Ethics Committee Approval

Coventry NHS
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Dr P O'Hare
Clinical Reader in Medicine
The University of Warwick
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ljsc/hrt

9 August 2000

Dear Dr O'Hare

CREC011/07/00 (Please quote this reference number on all future correspondence) Non Sponsored research. Non MREC Application.
Pilot Study: United Kingdom Asian Diabetics Study (UKADS), a Multiple Risk Intervention Trial. Protocol Not Dated.

Thank you for the above study, which was considered by Coventry Research Ethics Committee at its meeting on 18 July 2000.

The following documentation has been reviewed:-

- Your signed and dated Curriculum Vitae;
- UKADS Study protocol version not dated;
- Patient Information Sheet (Available also in Urdu and Punjabi) version not dated;
- Form of Consent version not dated;
- The Diabetes Treatment Satisfaction Questionnaire [illegible].
- Interview Questionnaire version not dated;
- 'Notes to the Interviewer' document.

I am pleased to inform you that the Committee has given the structured Questionnaire (to explore the health beliefs, treatment satisfaction and knowledge of Asian diabetic patients), and the main study its approval.

However, the following points, concerning the Patient Information Sheet, are made in a constructive vein and you are advised to address them accordingly.

Patient Information Sheet

Under the heading **'What benefits can I expect'** you state that there are no special arrangements for compensation if the patient agrees to take part in the study and suffers any harm. You do not state what possible harm can happen to the patient. Would you confirm if you have discussed this statement with The University of Warwick? The Committee acknowledges that this is a pilot project involving GP practices, but felt that the position regarding indemnity must be accurate within the Patient Information Sheet.

You have referred to 'people of Asian origin' and 'people of Indo-Asian origin'. We felt that only one term should be used i.e. the term commonly acceptable to the people involved.

I look forward to hearing from you. It would be helpful to have your comments say before week ending 2 September 2000. For completeness of the study file, would you also kindly forward the amended Patient Information Sheet.

Yours sincerely

L J Sant Cassia

L J SANT CASSIA
CHAIRMAN
COVENTRY RESEARCH ETHICS COMMITTEE

Copy : Mrs K Garnett, PhD Student c/o Dr. P O'Hare.

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29 August 2000

Dear Dr O'Hare

CREC011/07/00 (Please quote this reference number on all future correspondence). Non Sponsored research. Non MREC Application.
Pilot Study: United Kingdom Asian Diabetics Study (UKADS), a Multiple Risk Intervention Trial. Protocol Not Dated.

Thank you for your letter of 21 August 2000, and amended Patient Information Sheet. Please accept my apologies for the delay in responding, but we are dealing with a back-log; this is due to a temporary staff shortage.

I confirm that the study has full approval.

It is assumed that you will have notified the appropriate personnel at the University of Warwick of your intention to undertake this study, in order to qualify for the relevant insurance cover.

Yours sincerely

L J SANT CASSIA
CHAIRMAN
COVENTRY RESEARCH ETHICS COMMITTEE

Copy: Mrs K Garnett, PhD Student c/o Dr. P O'Hare.

Appendix I

Covering letters to interview

P ROY MB. BS. DFFP
M E N DOWNING BA. MB. CH.B. DRCOG. DOccMed
J SINGH MB. BS. MD. DFFP

THE HEALTH CENTRE
1 HOWARD STREET
COVENTRY CV1 4GH

Tel No: 024 7622 0661
Fax No: 024 7622 8300

Dear

As part of her research project for Ph. D. Kym Garnett is currently undertaking research on people's attitude and understanding of diabetes.

It would be of help to her and the research if she could interview you.

You do not have to participate if you do not wish, but it would be of great benefit to her and the research project if you could assist.

She will be contacting you personally in the near future.

Yours sincerely

Dr P. Roy

9th March 2001

Dear

If you wish to participant in my research project, please write your name, current address with postcode and telephone number(s) in the space provided below tear it off and forward it to myself in the enclosed pre-paid envelope.

Please *remember* to write down your telephone number(s) so that I can contact and make an appointment that suits you.

May I take this opportunity to thank you in advance for your time and your kind support.

Yours sincerely,

Kym Pisitchayakhon-Garnett B.A., MSc.

....

NAME:

....

ADDRESS:

....

....

TELEPHONE NUMBER(S):

....

DAY PREFFERED FOR AN APPOINTMENT (please circle)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

TIME PREFFERED FOR AN APPOINTMENT (please circle)

AM	PM

Appendix I

Interview Schedule – English version

INTERVIEW SCHEDULE

During this interview I would like to ask you a number of questions about you and your diabetes. There are no right or wrong answers, except for a diabetes quiz, which assesses your knowledge of diabetes. It is very important that you respond to each of these questions according to your actual knowledge, feelings and beliefs.

Please do not hesitate to ask if you do not understand a question clearly. Your answers will be treated in the strictest confidence and this questionnaire is anonymous. The findings of this study will help us to understand how people manage their diabetes, and perhaps help with planning health care provision that better suits some patients' needs. Thank you.

First, I want to ask you a few questions about yourself for background information.

1	Male
2	Female

1. When were you born?

2. Where did your family come from originally?

1. United Kingdom	2. India	3. Pakistan	4. Bangladesh	5. Other......................

Father from ....
Mother from ....

3. Which country were you born in?

1. United Kingdom	2. India	3. Pakistan	4. Bangladesh	5. Other......................

<u>Notes to the interviewer:</u>

If the answer in Q3 is not "United Kingdom" please ask Q3.1.

3.1. How long have you been living in the UK?

4. Which language do you feel most comfortable speaking?

1	English	
2	Punjabi	
3	Gujarati	
4	Pakistani Urdu	
5	Bengali	
6	Sylhet	
7	Mirpuri	
8	Other...........................	

5. Can you please specify your religion, if you have got one?

1	Christianity
2	Hinduism
3	Islamic/Muslim
4	Sikhism
5	Buddhism
6	Other......................

6. What is your marital status?

1. Single	2. Married	3. Divorced	4. Separated	5. Widowed	Other ....

7. How many children do you have? Please specify their ages.

8. Can you please list the people who live in the house with you and describe their relationship to you?

9. Now could you describe your educational background? Which of these four categories best describes your educational background?

1. None	2. Five or less than 5 years at school. For example, primary school.	3. More than 5 years at school. For example, secondary school and high school.	4. Higher. For example, college and university.

10. What is your current state of employment?

1. Full time employment	2. Part time employment	3. unemployed	4. Housewife	5. Pensioner	6. Other ....

11. Now could you describe your monthly income? Which of these five categories best describes your monthly income?

1. None	2. £ 1 - 500	3. £ 501 - 1000	4. £ 1001 – 1500	5. More than £ 1501

12. Can you tell me, how many bedrooms there are in your house?

Now, I would like to ask you a few general questions about your diabetes and your diabetic management.

1. Do you smoke?

1	Yes
2	No

1.1. How long you have been smoking?

1.2. Approximately, how many cigarettes do you smoke per day?

2. Do you chew betel nut?

1	Yes
2	No

2.1. How long you have been chewing?

1.2. Approximately, how many betel nuts do you chew per day?

3. What is your weight?

3.1 How tall are you?

4. How long have you been diagnosed with diabetes?

5. There are four recommended ways of controlling and managing diabetes. Can you please select the one that is advised to you in the management of your diabetes?

1. Diet alone   2. Diet plus tablets   3. Diet plus insulin   4 Diet plus tablet(s) plus insulin

Notes to the interviewer:

The following questions (Q6 – Q8) will be asked according to the answer received from Question 5.

[Question 6 is for answer 2. Diet plus tablets]

6. How many tablets for diabetes are you advised to take per day?

[Q7 is for answer 3. Diet plus insulin]

7. How many insulin injections are you advised to take per day?

[Q8 is for answer 4. Diet plus tablets plus insulin]

8. How many tablets and insulin injections are you advised to take per day?

[Q 8.1 – 8.3 are <u>only</u> for a participant who is on insulin treatment]

8.1. How long have been using insulin injections?

(1.) less than a year	(2.) 1 – 3 years	(3.) 3 years and more

8.2. Do you do insulin injection yourself?

(1.) Yes,	(2.) No,

8.3 If no, who have been helping you most of the time?

(1.) husband/wife	(2.) children	(3.) relative	(4.) friend	(5.) health worker	(6.) I do it myself

9. Are you advised to take tablets for controlling your blood pressure? Can please specify the number of tablets taken per day?

10. There are three ways of providing care for diabetes. Can you please tell me which one of these health providers is involved with your diabetes care?

1. General Practitioner only	2. Shared between General Practitioner + Hospital	3. Hospital only

11. Do you have a family history of diabetes? Please specify their relationship to you.

1. Yes,	2. No

12. Do you have any preference as to whether your diabetes is managed by a male or female doctor? Can you please specify the reasons?

0. Not at all	1. Yes,

13. Now could you describe your doctor(s) ethnicity? Which of these five categories best describes his or her ethnicity?

1. European (please specify his/her country of origin, if you know) ……………………	2. Indian	3. Pakistani	4. Bangladeshi	5. Other………………………

14. Do you have any preference as to the ethnic origin of the doctor involved with the provision of your diabetic care? Please specify.

0. Not at all	1. Yes,

15. Approximately, how long does it take you to travel to attend your diabetes appointments?

16. Which type of transport do you use when attending your diabetes appointments?

1. Own transport	2. Public transport	3. Other………………………

17. Can you please specify the groups of health professionals who have been involved in educating you about diabetes? For example, nurses, dietician, chiropodist.

1. Nurses	2. Doctors	3. Other (Dietician, Chiropodist, ect.)

18. When was the last time you received information about the management of diabetes?

1. Within 1 year	2. More than 1 year ago

19. Have you suffered any complications since you were diagnosed diabetic? Please specify.

	Tick		
1. Yes,		1. Blurred vision(s) 2. Cataracts 3. Kidney(s)' problem 4. Nerve's problem(s) 5. Sexual problem(s) for example, impotent 6. Skin problem(s) for example, redness, thinness and itchiness 7. Heart problem(s) 8. Feet problem(s) for example, numbness, pins & needles, changes in sharp of your feet, or a feeling of walking on cotton wool or pebbles 9. Amputation	2. No

The next set of questions is about using forms of treatments apart from prescribed western medicine.

1. There are several forms of alternative treatments for diabetes apart from the one prescribed by your western medical doctor. Can you please <u>tell me whether or not</u> you have used the following treatments?

		0. None
Yes	No	1. Herbal remedies
Yes	No	2. Aromatherapy (for example the use of incense, aromatic herbs, perfumes and oils)
Yes	No	3. Ayurvedic medicine (for example the use of heavy metals)
Yes	No	4. Faith healing or Spiritual medicine (for example the use of prayer and religious beliefs)
Yes	No	5. Organic/healthy foods
Yes	No	6. Homeopathy or the use of natural remedies
Yes	No	7. Transcendental meditation
Yes	No	8. Yoga
Yes	No	9. Other ....

<u>Notes to the Interviewer:</u>
If the answer to Q.1 is 'Yes' to 1, 2, 3, 5 or 6, please continue asking the subsequent questions (Q.2 – Q.6):

2. Do you use natural parts from trees, herbs or medicinal plants for your diabetes? For example, karela or bitter melon.

		Tick	
0. None	1. Yes,		1. Karela juice or tablets 2. Cerasee tea 3. Wooden tumblers of false teak 4. Bhadraprash (crushed dried herbs) 5. Crushed dried wild creeper's leave from Bengal 6. Guar gum (Indian cluster beans) 7. Periwinkle (An infusion prepared from dried leaves) 8. Unripe Ackee fruit from Jamica 9. Other ______

3. From Question number 2, how frequently do you use these medicinal plants for your diabetes?

0	None
1	Once a month
2	Once a week
3	Daily
4	Other ....

4. Have you ever <u>informed</u> your doctor or other health care professionals that you are using these medicinal plants for your diabetes?

0. None	1. Yes,	2. Never

5. Would you recommend the use of these medicinal plants to your diabetic friends?

0. None	1. Yes, (please specify all the names that you can recall)	2. No

6. How did you discover the use of these medicinal plants?

0	None
1.	Own & family's knowledge
2.	Recommendations from friends and/or family's member(s)
3.	Recommendations from Herbal remedy's healer(s)
4.	Recommendations from medical staff
5.	Recommendations from media (for example Newspapers, TV, radio, etc.)
6.	Other

The next set of questions is different from the previous ones. There are sets of statements which ask you to specify your opinion to whether you are strongly disagree; disagree; undecided; agree or strongly agree with it.

As I have mentioned earlier, there is no right or wrong answer. You are entitled to your own opinion. However, it is very important that you are responding to each of these statements according to your actual knowledge, feelings and beliefs.
We will start question 1 when you are ready.

Notes to the interviewer:

Please hand out the scale to your participant before start asking him/her questions.

1. I do not consider myself as ill just because I have diabetes

Strongly disagree 5	disagree 4	Undecided 3	agree 2	Strongly agree 1

2. I hate having diabetes

Strongly disagree 1	disagree 2	Undecided 3	agree 4	Strongly agree 5

3. Diabetes spoils my life

Strongly disagree 1	disagree 2	Undecided 3	agree 4	Strongly agree 5

4. I feel different from other people because I have diabetes

Strongly disagree 1	disagree 2	Undecided 3	agree 4	Strongly agree 5

5. People seem to think I am different because I have diabetes

Strongly disagree	disagree	Undecided	agree	Strongly agree
1	2	3	4	5

6. It is difficult to lead a normal life with diabetes

Strongly disagree	disagree	Undecided	agree	Strongly agree
1	2	3	4	5

7. My life would be very much better if I did not have diabetes

Strongly disagree	disagree	Undecided	agree	Strongly agree
1	2	3	4	5

8. I often feel that I do not deserve to have diabetes

Strongly disagree	disagree	Undecided	agree	Strongly agree
1	2	3	4	5

9. Having diabetes has not really affected my life in any major way

Strongly disagree	disagree	Undecided	agree	Strongly agree
5	4	3	2	1

10. I get really miserable because of diabetes

Strongly disagree	disagree	Undecided	agree	Strongly agree
1	2	3	4	5

11. People do not understand the problems I have with diabetes

Strongly disagree	disagree	Undecided	agree	Strongly agree
1	2	3	4	5

12. Well-controlled diabetes does not affect normal activities

Strongly disagree 5	Disagree 4	Undecided 3	agree 2	Strongly agree 1

13. I manage my diabetes very well

Strongly disagree 5	disagree 4	Undecided 3	agree 2	Strongly agree 1

14. My personality has changed for the worse since I had diabetes

Strongly disagree 1	disagree 2	Undecided 3	agree 4	Strongly agree 5

15. As a diabetic I cannot be considered a well person

Strongly disagree 1	disagree 2	Undecided 3	agree 4	Strongly agree 5

16. Having diabetes stops me from doing a lot of things

Strongly disagree 1	disagree 2	Undecided 3	agree 4	Strongly agree 5

Now I would like to ask you about your thoughts of the prescribed western treatment, medications, the health care team and medical information and advice.
It is very similar to the last set of questions. You will have to choose your answer accordingly to your feelings towards each statement I have read out to you.

Again there is no right or wrong answer and, you are entitled to your own opinion. I will start the first question as soon as you are ready.

Notes to the interviewer:

Please hand out the scale to your participant according to the question number, before asking him/her questions.

1. Can you please choose one answer from, either Very inconvenient, Inconvenient, Undecided, Convenient or Very convenient, from your handout after I have read this statement out to you?

How convenient do you find the recommended treatment?

Very inconvenient	Inconvenient	Undecided	Convenient	Very convenient
0	1	2	3	4

2. Can you please choose one answer from, either Very dissatisfied, Dissatisfied, Undecided, Satisfied or Very satisfied, from your handout after I have read this statement out to you?

How satisfy do you feel with the treatment?

Very dissatisfied	Dissatisfied	Undecided	Satisfied	Very satisfied
0	1	2	3	4

3. Can you please choose one answer from, either, No, it is very difficult, difficult to follow, Undecided, easy to follow, or Yes, it is very easy to follow, from your handout after I have read this statement out to you?

Do you think that this treatment is difficult for you to follow?

It is very difficult to follow 0	Difficult to follow 1	Undecided 2	easy to follow 3	It is very easy to follow 4

4. From 0 to 10, **can you please score your understanding of the prescribed treatment works for you?**

0 Not at all 0	1 1/10	2 2/10	3 3/10	4 4/10	5 5/10	6 6/10	7 7/10	8 8/10	9 9/10	10 Completely

5. Can you please choose one answer from either, No, I don't need it at all, a little, quite a lot, much more, or very much more, from the handout after I have read this statement?

Do you think that you could do with more advice on this treatment?

No, I do not need it at all 4	A little 3	Quite a lot 2	Much more 1	Very much more 0

6. Can you please choose one answer from either, Not at all, Rarely, Sometimes, Most of the time or All the time from the handout after I have read this statement?

Do you find taking medications unpleasant to take?

Not at all	Rarely	Sometimes	Most of the time	All the time
4	3	2	1	0

7. Can you please choose one answer from either, Not at all, Rarely, Sometimes, Most of the time or All the time from the handout after I have read this statement?

Do you wish you could have another additional form of treatment apart from your prescribed medication?

Not at all	Rarely	Sometimes	Most of the time	All the time
4	3	2	1	0

8. Can you please choose one answer from either, Very dissatisfied, Dissatisfied, Undecided, Satisfied, or Very satisfied, from the handout after I have read this statement?

Are you satisfied with the health care team you are with?

Very dissatisfied	Dissatisfied	Undecided	Satisfied	Very satisfied
0	1	2	3	4

9. Can you please choose one answer from, either, Very inadequate, Inadequate, Undecided, Adequate, or Very adequate, from the handout after I have read this statement?

Do you feel that you are receiving adequate care from your health care team?

Very inadequate	Inadequate	Undecided	Adequate	Very adequate
0	1	2	3	4

10. Can you please choose one answer from either, Uncomfortable at all, Uncomfortable, Undecided, Comfortable, or Very comfortable, from the handout after I have read this statement?

Do you feel comfortable with the health care team during the routine meeting?

Very uncomfortable	Uncomfortable	Undecided	Comfortable	Very comfortable
0	1	2	3	4

11. Can you please choose one answer from either, Definitely not, Maybe, Undecided, Most probably, or Definite would, from the handout after I have read this statement?

Would you recommend this health care team to someone else with your kind of diabetes?

Definitely no	Probably not	Undecided	Probably yes	Definitely yes
0	1	2	3	4

12. Can you please choose one answer from either, <u>Very dissatisfied</u>, <u>Dissatisfied</u>, <u>Undecided</u>, <u>Satisfied</u>, or <u>Very satisfied</u>, from the handout after I have read this statement?

Are you satisfied with the medical advice you receive from your health care team?

Very dissatisfied	Dissatisfied	Undecided	Satisfied	Very satisfied
0	1	2	3	4

13. Can you please choose one answer from either, <u>Very dissatisfied</u>, <u>Dissatisfied</u>, <u>Undecided</u>, <u>Satisfied</u>, or <u>Very satisfied</u>, from the handout after I have read this statement?

Are you satisfied with the availability of health information at your current diabetic centre?

Very dissatisfied	Dissatisfied	Undecided	Satisfied	Very satisfied
0	1	2	3	4

14. Can you please choose one answer from, either, <u>Not very valuable</u>, <u>Not valuable</u>, <u>Undecided</u>, <u>Valuable</u>, or <u>Very valuable</u>, from the handout after I have read this statement?

How valuable would it be to have other forms of health information written in your main language?

N/A	Not very valuable	Not valuable	Undecided	Valuable	Very valuable
5	4	3	2	1	0

15. Can you please choose one answer from, either, Not very valuable, Not valuable, Undecided, Valuable, or Very valuable, from the handout after I have read this statement?

How valuable is it to have staff speaking in your own language?

N/A	Not very valuable	Not valuable	Undecided	Valuable	Very valuable
5	4	3	2	1	0

16. Can you please choose one answer from, either, Very dissatisfied, Dissatisfied, Undecided, Satisfied, or Very satisfied, from the handout after I have read this statement?

How satisfied are you with the facilities you are using for the treatment of your diabetes?

Very dissatisfied	Dissatisfied	Undecided	Satisfied	Very satisfied
0	1	2	3	4

The next part is a short quiz to find out how much you know about diabetes. There are 25 questions and, each has got just one answer.

Your answer can either be 'TRUE' if you think that the statement is correct, 'FALSE' if you think that the statement is incorrect or 'Don't know' if you really do not know the answer.

It is important that you try your very best to answer the question. I will start the first question as soon as you are ready.

1. Diabetes is a condition in which the body cannot use food properly.

TRUE	FALSE	Don't know

2. Frequent urination, thirst and hunger are the most common symptoms of diabetes.

TRUE	FALSE	Don't know

3. Someone with diabetes should check his or her blood/urine sugar daily.

TRUE	FALSE	Don't know

4. A little glucose in the urine is normal.

TRUE	FALSE	Don't know

5. Obesity has nothing to do with the occurrence of diabetes.

TRUE	FALSE	Don't know

6. Stressful experiences can affect the blood sugar levels.

TRUE	FALSE	Don't know

7. It is not necessary to control the amount of food eaten when taking diabetes pills.

TRUE	FALSE	Don't know

8. Physical exercise reduces blood sugar level.

TRUE	FALSE	Don't know

9. Manual activities can increase sugar level in urine.

TRUE	FALSE	Don't know

10. Blood sugar level raises after a long physical activity.

TRUE	FALSE	Don't know

11. Meals should be eaten regularly throughout the day, e.g. 4-5 hours apart.

TRUE	FALSE	Don't know

12. People with diabetes can eat foods containing sugar as long as recommended tablets or insulin are taken regularly.

TRUE	FALSE	Don't know

13. Sugary foods do not generally affect blood sugar levels.

TRUE	FALSE	Don't know

14. Special diabetic products can be eaten freely without leading to weight gain.

TRUE	FALSE	Don't know

15. Regular examinations are not necessary for people with diabetes who feel well.

TRUE	FALSE	Don't know

16. Early complications can be discovered through regular examinations.

TRUE	FALSE	Don't know

17. Eye examinations with an ophthalmoscope (special torch for looking at the back of the eye) are not needed if diabetes is well controlled.

TRUE	FALSE	Don't know

18. Eye examinations with an ophthalmoscope (special torch for looking at the back of the eye) are not normally required for people treated by diet alone.

TRUE	FALSE	Don't know

19. Risks of heart disease and stroke from smoking are similar between a person with diabetes and the one without diabetes.

TRUE	FALSE	Don't know

20. All alcoholic drinks raise blood sugar level.

TRUE	FALSE	Don't know

21. The HbA1c level in the blood...

(a) can show if you are getting hypos

TRUE	FALSE	Don't know

(b) is the average blood sugar over the past 6-8 weeks

TRUE	FALSE	Don't know

(c) is the average blood sugar over the past 6-8 days

TRUE	FALSE	Don't know

(d) is the average blood sugar over the past 24 hours

TRUE	FALSE	Don't know

22. Can you specify the highest ideal HbA1c level? ....

don't know

23. Can you specify the lowest ideal HbA1c level? ....

don't know

24. What is the normal range for blood sugar?

(a) 2-4 mmol/l
(b) 4-8 mmol/l.
(c) 6-12 mmol/l.
(d) 8-14 mmol/l.
(e) Don't know

25. What is the target blood pressure for diabetes without complications?

(a) 110/80 mmHg.
(b) 180/90 mmHg.
(c) 140/80 mmHg.
(d) 150/90 mmHg.
(e) Don't know

Thank you for your kind co-operation.

Self Care Activity (SCA) Group No.1: Diet plus Tablet(s)

Note to an Interviewer:

This set of questions is *only* for participants who use diet and diabetic tablet(s) to control their diabetes.

Please hand out the scale to your participant according to the question number, before asking him/her questions.

Now, I would like to ask you about the ways that you manage your diabetes on a daily basis. it is similar to the last set of questions. You will have to choose an answer which best describes the way in which you managed your diabetes in the past 7 days.

1. On how many of the last 7 day did you include fresh fruits, fresh vegetables, whole grain breads, dried beans and peas in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
8	7	6	5	4	3	2	1

2. On how many of the last 7 days include butter, ghee, ice cream, oil, almonds, cashew nuts and seeds, mayonnaise, avocado, deep-fried foods, salad dressing, bacon, and other meats with fat or skin in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

3. On how many of the last 7 days did you include sweets and desserts, such as pie, cake, jelly, soft drinks, cookies in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

4. On how many of the last 7 days did you do some exercise (for example, going for a walk) which lasted at least 20 minutes?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

5. On how many of the last 7 days did you test your blood glucose?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

6. How often do you taking recommended tablet(s) for your diabetes inconvenient or difficult?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

7. How much do diabetes tablet(s) bother you with side effects?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

8. How often do you miss taking the recommended tablet(s) for your diabetes?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

9. How often do you miss your diabetes appointments?

Never	Rarely	Sometimes	Usually	Always
4	3	2	1	0

Self Care Activity (SCA) Group No.2: Diet plus insulin injection(s)

Note to an Interviewer:

This set of questions is *only* for participants who use diet and insulin injection(s) to control their diabetes.

Please hand out the scale to your participant according to the question number, before asking him/her questions.

Now, I would like to ask you about the ways that you manage your diabetes on a daily basis. it is similar to the last set of questions. You will have to choose an answer which best describes the way in which you managed your diabetes in the past 7 days.

1. On how many of the last 7 day did you include fresh fruits, fresh vegetables, whole grain breads, dried beans and peas in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
8	7	6	5	4	3	2	1

2. On how many of the last 7 days include butter, ghee, ice cream, oil, almonds, cashew nuts and seeds, mayonnaise, avocado, salad dressing, bacon, and other meats with fat or skin in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

3. On how many of the last 7 days did you include sweets and desserts, such as pie, cake, jelly, soft drinks, cookies in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

4. On how many of the last 7 days did you do some exercise (for example, going for a walk) which lasted at least 20 minutes?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

5. On how many of the last 7 days did you test your blood glucose?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

6. How often do you taking recommended insulin injection(s) for your diabetes inconvenient or difficult?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

7. How much do insulin injection(s) bother you with side effects?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

8. How often do you miss taking the recommended insulin injection(s) for your diabetes?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

9. How often do you miss your diabetes appointments?

Never	Rarely	Sometimes	Usually	Always
4	3	2	1	0

Self Care Activity (SCA) Group No.1: Diet plus Tablet(s)

Note to an Interviewer:

This set of questions is *only* for *Asian* participants who use diet and diabetic tablet(s) to control their diabetes.

Please hand out the scale to your participant according to the question number, before asking him/her questions.

Now, I would like to ask you about the ways that you manage your diabetes on a daily basis. It is similar to the last set of questions. You will have to choose an answer which best describes the way in which you managed your diabetes in the past 7 days.

1. On how many of the last 7 day did you include fresh fruits, fresh vegetables, whole grain breads, dried beans and peas in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
8	7	6	5	4	3	2	1

2. On how many of the last 7 days include butter, ghee, ice cream, oil, almonds, cashew nuts and seeds, mayonnaise, avocado, deep-fried foods like Bhatura, basmati rice fried in butter, salad dressing, and other meats with fat or skin in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

3. On how many of the last 7 days did you include sweets and desserts, such as laddoo, jalaibi, gajar halwa, mithai, honey, pie, cake, jelly, soft drinks, cookies in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

4. On how many of the last 7 days did you do some exercise (for example, going for a walk) which lasted at least 20 minutes?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

5. On how many of the last 7 days did you test your blood glucose?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

6. How often do you taking recommended tablet(s) for your diabetes inconvenient or difficult?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

7. How much do diabetes tablet(s) bother you with side effects?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

8. How often do you miss taking the recommended tablet(s) for your diabetes?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

9. How often do you miss your diabetes appointments?

Never	Rarely	Sometimes	Usually	Always
4	3	2	1	0

Self Care Activity (SCA) Group No.2: Diet plus insulin injection(s)

Note to an Interviewer:

This set of questions is *only* for *Asian* participants who use diet and insulin injection(s) to control their diabetes.

Please hand out the scale to your participant according to the question number, before asking him/her questions.

Now, I would like to ask you about the ways that you manage your diabetes on a daily basis. It is similar to the last set of questions. You will have to choose an answer which best describes the way in which you managed your diabetes in the past 7 days.

1. On how many of the last 7 day did you include fresh fruits, fresh vegetables, whole grain breads, dried beans and peas in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
8	7	6	5	4	3	2	1

2. On how many of the last 7 days include butter, ghee, ice cream, oil, almonds, cashew nuts and seeds, mayonnaise, avocado, deep-fried foods like Bhatura, basmati rice fried in butter, salad dressing, and other meats with fat or skin in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

3. On how many of the last 7 days did you include sweets and desserts, such as laddoo, jalaibi, gajar halwa, mithai, honey, pie, cake, jelly, soft drinks, cookies in your meals?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

4. On how many of the last 7 days did you do some exercise (for example, going for a walk) which lasted at least 20 minutes?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

5. On how many of the last 7 days did you test your blood glucose?

All 7 days	6 day	5 days	4 days	3 days	2 days	1 days	None of the day
1	2	3	4	5	6	7	8

6. How often do you taking recommended insulin injection(s) for your diabetes inconvenient or difficult?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

7. How much do insulin injection(s) bother you with side effects?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

8. How often do you miss taking the recommended insulin injection(s) for your diabetes?

None of the time	Some of the time	Half of the time	Most of the time	All of the time
4	3	2	1	0

9. How often do you miss your diabetes appointments?

Never	Rarely	Sometimes	Usually	Always
4	3	2	1	0

Interview Schedule – Punjabi version

ਇਸ ਗੱਲਬਾਤ ਦੇ ਦੌਰਾਨ ਵਿਚ ਜੋ ਨਕਸ਼ੇ ਪਾਏ ਅਤੇ ਤਸਵੀਰੀ ਡਾਈਆਪੋਜ਼ੀਟਿਵ
(ਪੰਜਾਬ ਵਿਚ ਸਥਾਨ) ਦੇ ਪੌਣਾਂ ਉਤੇ ਤਿੰਨ ਗਵਾਹਾਂ ਜਵਾਬ ਪੁੱਛਿਆ ਹੋਇਆ ਹੈ। ਇਸ
ਗਵਾਹਾਂ ਦੇ ਜਵਾਬ ਤੁਸੀਂ ਵੀ ਦੇ ਸਕਦੇ ਹਨ। ਜੋ ਤਾ ਜਿਵੇਂ ਡਾਈਆਪੋਜ਼ੀਟਿਵ-ਪਰਦੇ
ਵਾਲੀ ਇਸ ਪਰਨਾਲੀ ਪਾਸੇ ਤਸਵੀਰੀ ਜਾਣਕਾਰੀ ਜਾਣਾ ਸੌਖਾ ਹੋਇਆ ਹੈ। ਇਹ ਧਿਆਨ
ਜਰੂਰੀ ਹੈ ਕਿ ਤੁਸੀਂ ਇਹਨਾਂ ਗਵਾਹਾਂ ਦੇ ਜਵਾਬ, ਆਪਣੇ ਅਸਲੀ ਵਿਚਾਰਾਂ ਅਤੇ
ਵਿਸ਼ਵਾਸਾਂ ਅਨੁਸਾਰ ਠੀਕ-ਠੀਕ ਦੇਣੇ।

ਜੇ ਕਿਸੇ ਜਵਾਬ ਦੀ ਸਮਝ ਨਾ ਲੱਗੇ, ਤਾਂ ਸਾਨੂੰ ਦੁਬਾਰਾ ਪੁੱਛ ਸਕਦੇ ਹੋ।
ਇਸ ਗੱਲਬਾਤ ਅਤੇ ਪ੍ਰਸ਼ਨਾਵਲੀ ਦੇ ਉੱਤਰ, ਗੁਮਨਾਮ ਅਤੇ ਗੁਪਤ ਰੱਖਿਆ ਜਾਏ।
ਇਸ ਪ੍ਰਸ਼ਨਾਵਲੀ ਦੇ ਬਾਦ, ਸਾਨੂੰ ਜਾਣਕਾਰੀ ਦੇਵੋ ਜੀ ਕਿ, ਤੁਸੀਂ ਇਸ ਡਾਈਆਪੋਜ਼ੀਟਿਵ
ਨੂੰ ਕਿਸ ਤਰ੍ਹਾਂ ਕੰਟਰੋਲ ਕਰਦੇ ਹੋ। ਅਤੇ ਇਸ ਪਰਨਾਲੀ ਦੇ ਅੰਕੜਿਆਂ ਦੀ ਕਿਸ ਤਰ੍ਹਾਂ ਪਾਸੇ
ਕੋਈ ਚੰਗੀ ਚੀਜ਼ ਦਾ ਪ੍ਰਬੰਧ ਭਵਿੱਖ ਵਿਚ ਸਹਾਇਤ ਕਰੇਗਾ। ਧੰਨਵਾਦ।

ਮੈਂ ਕੁਝ ਪ੍ਰਸ਼ਨ ਤੁਹਾਡੇ ਬਾਰੇ ਪੁਛਾਂ

1	ਆਦਮੀ
2	ਔਰਤ

1. ਤੁਹਾਡਾ ਜਨਮ ਕਿਥੇ ਹੋਇਆ ਸੀ

2. ਤੁਹਾਡਾ ਪਰਿਵਾਰ ਅਸਲ ਵਿਚ ਕਿਥੋਂ ਆਇਆ ਹੈ।

1. ਇੰਗਲੈਂਡ	2. ਭਾਰਤ	3. ਪਾਕਿਸਤਾਨ	4. ਬੰਗਲਾਦੇਸ਼	5. ਕੋਈ ਹੋਰ

ਇਹ ਕਿਥੋਂ ਆਇਆ . . .
ਜਾਂ ਕਿਥੋਂ ਆਈ ਸੀ . . –

3. ਤੁਹਾਡਾ ਜਨਮ ਕਿਥੇ ਹੋਇਆ ਸੀ

1. ਇੰਗਲੈਂਡ	2. ਭਾਰਤ	3. ਪਾਕਿਸਤਾਨ	4. ਬੰਗਲਾਦੇਸ਼	5. ਕੋਈ ਹੋਰ . . .

ਜੇਕਰ ਪ੍ਰ. 3 ਦਾ ਉਤਰ ਇੰਗਲੈਂਡ ਨਹੀਂ ਹੈ ਤਾਂ ਪ੍ਰ: 3.1 ਪੁੱਛੋ

3.1. ਤੁਸੀਂ ਇੰਗਲੈਂਡ ਵਿਚ ਕਿੰਨੇ ਸਾਲਾਂ ਤੋਂ ਰਹ ਰਹੇ ਹੋ?

4. ਕਿਹੜੀ ਭਾਸ਼ਾ ਤੁਸੀਂ ਜ਼ਿਆਦਾ ਸਮਝ ਬੋਲ ਸਕਦੇ ਹੋ

1 ਅੰਗਰੇਜ਼ੀ
2 ਪੰਜਾਬੀ
3 ਗੁਜਰਾਤੀ
4 ਉਰਦੂ
5 ਬੰਗਾਲੀ
6 ਹਿੰਦੀ
7 ਸੋਮਾਲੀ
8 ਕੋਈ ਹੋਰ ---

5. ਜੇ ਤੁਹਾਡਾ ਕੋਈ ਧਰਮ ਹੈ ਤਾਂ ਉਹ ਕੀ ਹੈ।

1 ਹਿੰਦੂ
2 ਮੁਸਲਮਾਨ
3 ਸਿੱਖ
4 ਬੁੱਧ
5 ਕ੍ਰਿਸ਼ਚਿਅਨ
6 ਕੋਈ ਹੋਰ ---

6. ਤੁਹਾਡੇ ਵਿਆਹ ਬਾਰੇ

1. ਕੁਆਰੇ	2. ਵਿਆਹੇ	3. ਤਲਾਕ	4. ਅਲੱਗ ਅਲੱਗ	5. ਵਿਧਵਾ	ਕੋਈ ਹੋਰ

7. ਤੁਹਾਡੇ ਕਿੰਨੇ ਬੱਚੇ ਹਨ ਤੇ ਉਹਨਾਂ ਦੀ ਉਮਰ ਕੀ ਹੈ।

8. ਤੁਹਾਡੇ ਘਰ ਵਿਚ ਕੌਣ ਕੌਣ ਰਹਿੰਦਾ ਹੈ ਅਤੇ ਤੁਹਾਡੇ ਨਾਲ ਕੀ ਰਿਸ਼ਤਾ ਹੈ।

9. ਤੁਸੀਂ ਪੜ੍ਹਾਈ ਕਿੰਨੀ ਕੀ ਦਾ ਵੇਰਵਾ

1. ਕੋਈ ਨਹੀਂ ਸਕੂਲਿੰਗ	2. ਪੰਜ ਸਾਲ ਜਾਂ ਉਸ ਤੋਂ ਘੱਟ ਸਕੂਲ ਵਿਚ	3. 5 ਸਾਲ ਤੋਂ ਜ਼ਿਆਦਾ ਸਕੂਲ ਵਿਚ	4. ਕਾਲਜ, ਜਾਂ ਯੂਨੀਵਰਸਿਟੀਆਂ ਦੀ ਪੜ੍ਹਾਈ

10. ਤੁਸੀਂ ਕੰਮ ਕੀ ਕਿਸਮ ਕਰਦੇ ਹੋ। ਅੱਗੇ ਲਿਖਿਆ ਜਵਾਬ

1. ਆਪਣਾ ਕਿੱਤਾ	2. ਨੌਕਰੀ ਕਿੱਤਾ	3. ਕੋਈ ਨਹੀਂ	4. ਪੜ੍ਹਾਈ	5. ਬੇਰੁਜ਼ਗਾਰ	6. ਰਿਟਾਇਰ

11. ਤੁਹਾਡੀ ਆਮਦਨੀ ਦਾ ਅੰਦਾਜ਼ਾ, ਕਿੰਨੇ ਵਿਚ 5 ਵਿਚੋਂ ਤੁਹਾਡੇ ਹਫ਼ਤੇ ਹਿਸਾਬ ਦੀ ਕਮਾਈ ਕੀ ਹੈ

1.	2. £ 1 - 500	3. £ 501 - 1000	4. £ 1001 - 1500	5. £ 1501

12. ਤੁਹਾਡੇ ਘਰ ਵਿਚ ਕਿੰਨੇ ਬੱਚੇ ਰਹਿੰਦੇ ਹਨ।

13. ਤੁਹਾਡਾ ਪੋਸਟ ਕੋਡ ਕੀ ਹੈ

ਨੋਟ, ਜੇ ਤੁਹਾਨੂੰ ਸ਼ੂਗਰ ਦੀ ਬਿਮਾਰੀ ਹੈ ਤਾਂ ਤੁਹਾਡੀ ਸ਼ੂਗਰ ਬਾਰੇ, ਅਤੇ ਉਸ ਦੇ ਇਲਾਜ ਬਾਰੇ ਪੁੱਛਣਾ।

1. ਕੀ ਤੁਸੀਂ ਸਿਗਰਟ ਪੀਂਦੇ ਹੋ

- ਹਾਂ
- ਨਾਂ

1.1. ਤੁਸੀਂ ਕਿੰਨੀ ਦੇਰ ਤੋਂ ਸਿਗਰਟ ਪੀ ਰਹੇ ਹੋ

1.2. ਤੁਸੀਂ ਦਿਨ ਵਿਚ ਕਿੰਨੀਆਂ ਸਿਗਰਟ ਪੀਂਦੇ ਹੋ

2. ਤੁਹਾਡਾ ਭਾਰ ਕਿੰਨਾ ਹੈ

3. ਤੁਸੀਂ ਕਿੰਨੇ ਲੰਬੇ ਹੋ।

4. ਤੁਹਾਨੂੰ ਸ਼ੂਗਰ ਦੀ ਬਿਮਾਰੀ ਬਾਰੇ ਕਦੋਂ ਪਤਾ ਲੱਗਿਆ।

5. ਤੁਸੀਂ ਸ਼ੂਗਰ ਦੇ ਇਲਾਜ ਵਾਸਤੇ ਅਤੇ ਉਸ ਨੂੰ ਰੋਕਣ ਵਾਸਤੇ ਕੀ ਕਰਦੇ ਹੋ

1. ਖਾਣਾ ਪੀਣਾ 2. ਖਾਣ ਪੀਣ ਅਤੇ ਗੋਲੀਆਂ 3. ਖਾਣ ਪੀਣ ਤੇ ਟੀਕਾ 4. ਖਾਣ ਪੀਣ, ਗੋਲੀਆਂ, ਟੀਕਾ

1996 [illegible]

6. [illegible]

1997 [illegible]

7. [illegible]

1998 [illegible]

8. [illegible]

9. [illegible]

10. [illegible]

1. [illegible] 2. [illegible] + [illegible] 3. [illegible]

11. [illegible]

1. [illegible]	2. [illegible]

12. [illegible] ?

[illegible]

13.

1. [illegible]	2. [illegible]	3. [illegible]	4. [illegible]	5. [illegible]

[illegible]

14. [illegible] 57

[illegible]

15.

16. [illegible]

1. [illegible] 2. [illegible] 3. [illegible]

[illegible]

17. [illegible]

18. [illegible]

[illegible]

19. [illegible]

[illegible]

1. [illegible]

ਹਾਂ	ਨਹੀਂ	1. [illegible]
ਹਾਂ	ਨਹੀਂ	2. [illegible]
ਹਾਂ	ਨਹੀਂ	3. [illegible]
ਹਾਂ	ਨਹੀਂ	4. [illegible]
ਹਾਂ	ਨਹੀਂ	5. [illegible]
ਹਾਂ	ਨਹੀਂ	6. [illegible]
ਹਾਂ	ਨਹੀਂ	7. [illegible]
ਹਾਂ	ਨਹੀਂ	8. [illegible]
ਹਾਂ	ਨਹੀਂ	9. [illegible]

[illegible] 1, 2, 3, 5 [illegible] 6 [illegible] ?

2. [illegible]

1. ਹਾਂ [illegible]	2. ਨਹੀਂ

3. [illegible] 2 [illegible] ? [illegible]

1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible] - —

4. [illegible]

ਹਾਂ	ਨਹੀਂ

5. [illegible]

[illegible]

6

[illegible]

1.

[illegible] 1	[illegible] 2	[illegible] 3	[illegible] 4	[illegible] 5

2. [illegible]

1	2	3	4	5

3. [illegible]

1	2	3	4	5

4. [illegible]

1	2	3	4	5

5. [illegible]

1	2	3	4	5

6. [illegible]

1	2	3	4	5

7. [illegible]

1	2	3	4	5

8. [illegible]

1	2	3	4	5

9. [illegible]

1	2	3	4	5

10. [illegible]

1	2	3	4	5

11. [illegible]

1	2	3	4	5

12. [illegible]

1	2	3	4	5

13. [illegible]

1	2	3	4	5

14. [illegible]

1	2	3	4	5

15. [illegible]

1	2	3	4	5

16. [illegible]

1	2	3	4	5

17. [illegible]

1	2	3	4	5

1. ਤੁਹਾਨੂੰ ਸਮਾਜਿਕ ਰੁਤਬੇ ਕਿਸ ਦੀ ਜਾਣਕਾਰੀ ਹੈ।

ਬਿਲਕੁਲ

ਨੀਵਾਂ ਦਰਜਾ 0	ਨੀਵਾਂ 1 ਦਰਜਾ	ਮੱਧ ਹੈ 2	ਉੱਚਾ ਹੈ 3	ਬਿਲਕੁਲ ਉੱਚਾ ਹੈ 4

2.

ਤੁਸੀਂ ਕੀ ਸੋਚਦੇ ਹੋ ਸਮਾਜਿਕ ਰੁਤਬਾ ਪੱਕਾ।

0	1	2	3	4

3.

ਤੁਹਾਡੇ ਪਿਤਾ ਦਾ ਦਰਜਾ ਹੈ ਕਿ ਤੁਸੀਂ ਸਮਾਜਿਕ ਰੁਤਬੇ ਵੀ ਹੈ, ਜਾਣਦੇ

0	1	2	3	4

4. 0 ਤੋਂ 10 ਤਕ, ਤੁਹਾਨੂੰ ਕਿਸ ਦਰਜਾ ਹੈ ਕਿ ਤੁਸੀਂ ਸਮਾਜਿਕ ਰੁਤਬੇ
ਨੂੰ ਜਾਣਦੇ ਹੋ।

0	1	2	3	4	5	6	7	8	9	10

4. ਤੁਹਾਨੂੰ [illegible] ਹੈ ਕਿ ਤੁਹਾਨੂੰ [illegible] [illegible] [illegible] ਹਾਂ

ਨਹੀਂ 0	ਥੋੜੀ ਜਿਹੀ 1	[illegible] 2	[illegible] 3	[illegible] -4

5. ਤੁਹਾਨੂੰ [illegible] ਹੈ ਕਿ ਤੁਹਾਨੂੰ [illegible] [illegible] [illegible] ਹਾਂ

0	1	2	3	-4

6. ਤੁਹਾਨੂੰ [illegible] ਹੈ ਕਿ [illegible] [illegible] [illegible] [illegible] ਹਾਂ

ਬਿਲਕੁਲ ਨਹੀਂ 0	ਥੋੜੀ ਜਿਹੀ 1	ਕਦੇ-ਕਦੇ 2	[illegible] 3	ਹਮੇਸ਼ਾ [illegible] -4

7. ਤੁਸੀਂ [illegible] ਤੋਂ [illegible] [illegible] [illegible] [illegible] [illegible] ਦੇ [illegible]

ਨਹੀਂ 0	ਕਦੇ-ਕਦੇ 1	ਕਦੇ-ਕਦੇ 2	ਹਮੇਸ਼ਾ 3	ਹਮੇਸ਼ਾ [illegible] -4

8. ਤੁਸੀ [illegible]

[illegible] 0	[illegible] 1	[illegible] 2	[illegible] 3	[illegible] -4

9. [illegible]

[illegible] 0	[illegible] 1	ਪਤਾ ਨਹੀ 2	[illegible] 3	[illegible] -4

10. [illegible]

0	1	2	3	-4

11. ਤੁਸੀ [illegible]

0	1	2	3	-4

12. ਤੁਸੀ [illegible]

0	1	2	3	-4

13. [illegible]

0 1 2 3 4

14. [illegible]

5 4 3 2 1 0

15. ਤੁਹਾਨੂੰ ਕਿੰਨਾ [illegible] ਹੈ [illegible] [illegible] ਤੁਹਾਡੀ
[illegible] [illegible] ਹਾਂ।

0	1	2	3	4

16. ਤੁਸੀਂ ਕਿੰਨੇ ਕਿ [illegible] ਤੋਂ [illegible] [illegible] [illegible]

0	1	2	3	4

[illegible]

1.

[illegible]	[illegible]	[illegible]

2. [illegible]

3. [illegible]

4. [illegible]

5. [illegible]

6. [illegible]

7. [illegible]

8. [illegible]

9. [illegible]

10. [illegible]

[illegible]

[illegible]

11.

12. [illegible]

13. [illegible]

[illegible]

14.

15. [illegible]

16. [illegible]

17. [illegible]

18. [illegible]

19. [illegible]

20. [illegible]

21. HBA1C [illegible]

(a) [illegible] HYPO [illegible]

(b) [illegible] 6-8 weeks [illegible]

(c) [illegible] 6-8 days [illegible]

(d) [illegible] 24 [illegible]

22. [illegible] HBA1C [illegible] .... [illegible]

[illegible]

23.

24.

( ) 2 – 4 mmol/L
( ) 4 - 8 mmol/L
( ) 6 - 12
( ) 8 - 14
( ) ਕੋਈ ਨਹੀਂ

25. [illegible]

( ) 110/80 mm Hg
( ) 130/90
( ) 140/80
( ) 150/90
( ) ਕੋਈ ਨਹੀਂ

[illegible]

ਹੁਣ ਮੈਂ ਤੁਹਾਡੇ ਕੋਲੋਂ ਪੁੱਛਣਾ ਚਾਹੁੰਦਾ/ਦੀ ਹਾਂ ਕਿ ਤੁਸੀਂ ਹਰ ਰੋਜ਼ ਆਪਣੀ ਸ਼ੂਗਰ ਨੂੰ ਕਿਸ ਤਰ੍ਹਾਂ ਕਾਬੂ ਵਿੱਚ ਰੱਖਦੇ ਹੋ? ਇਹ ਪਿਛਲੇ ਹਫ਼ਤਿਆਂ ਦੀ ਗੱਲ ਹੋ ਰਹੀ ਹੈ। ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਆਪਣੀ ਸ਼ੂਗਰ ਨੂੰ ਕਿਸ ਤਰ੍ਹਾਂ ਕਾਬੂ ਵਿੱਚ ਕੀਤਾ, ਇਹਨਾਂ ਵਿੱਚੋਂ ਤੁਸੀਂ ਇੱਕ ਉੱਤਰ ਨੂੰ ਚੁਣਨਾ ਹੈ ਜੋ ਤੁਹਾਡੀ ਹਾਲਤ ਨੂੰ ਚੰਗੀ ਤਰ੍ਹਾਂ ਬਿਆਨ ਕਰਦਾ ਹੈ।

1. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਤਾਜ਼ਾ ਫਲ, ਤਾਜ਼ਾ ਸਬਜ਼ੀਆਂ ਸਾਬਤ ਦਾਣਿਆਂ ਵਾਲੀ ਖੁਰਾਕ, ਸੁੱਕੇ ਬੀਨਸ ਅਤੇ ਮਟਰ ਆਪਣੇ ਖਾਣੇ ਵਿੱਚ ਵਰਤੇ ਗਏ?

ਸਾਰੇ 7 ਦਿਨ	6 ਦਿਨ	5 ਦਿਨ	4 ਦਿਨ	3 ਦਿਨ	2 ਦਿਨ	1 ਦਿਨ	ਇੱਕ ਵੀ ਦਿਨ ਨਹੀਂ
8	7	6	5	4	3	2	1

2. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਕਿੰਨੀ ਵਾਰ ਤੁਸੀਂ ਆਪਣੇ ਭੋਜਨ ਵਿੱਚ ਘਿਉ, ਮੱਖਣ, ਆਈਸ-ਕਰੀਮ, ਕ੍ਰੀਮ, ਬਦਾਮ, ਕਾਜੂ ਅਤੇ ਬੀਜ, ਮੇਵੇ, ਸੌਸੇਜ਼, ਤਲੇ ਹੋਏ ਭੋਜਨ ਜਿਵੇਂ ਕਿ ਪਕੌੜੇ, ਮੱਖਣ ਵਿੱਚ ਬਣਾਏ ਪਰਾਂਠੇ, ਸਲਾਦ ਉੱਪਰ ਪਾਉਣ ਵਾਲੀ ਤਰੀਕਾ, ਮੀਟ ਦੇ ਉੱਪਰ ਚਰਬੀ ਜਾਂ ਮੀਟ ਦੇ ਉੱਪਰ ਚਮੜੀ ਸਮੇਤ ਖਾਧੀ ਹੈ?

ਸਾਰੇ 7 ਦਿਨ	6 ਦਿਨ	5 ਦਿਨ	4 ਦਿਨ	3 ਦਿਨ	2 ਦਿਨ	1 ਦਿਨ	ਇੱਕ ਵੀ ਦਿਨ ਨਹੀਂ
1	2	3	4	5	6	7	8

3. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਆਪਣੇ ਖਾਣੇ ਵਿੱਚ ਕਿੰਨੀ ਵਾਰ ਮਿਠਾਈ, ਮਿੱਠਾ ਜਿਵੇਂ ਕਿ ਲੱਡੂ, ਜਲੇਬੀ, ਗਾਜਰ ਹਲਵਾ, ਮਿਠਾਈ, ਬਿਸਕੁਟ, ਪਾਈ, ਕੇਕ, ਜੈਲੀ, ਗੈਸ ਵਾਲੀ ਡ੍ਰਿੰਕ ਅਤੇ ਕੁਕੀਜ਼ ਆਦਿ ਖਾਧਾ ਹੈ?

ਸਾਰੇ 7 ਦਿਨ	6 ਦਿਨ	5 ਦਿਨ	4 ਦਿਨ	3 ਦਿਨ	2 ਦਿਨ	1 ਦਿਨ	ਇੱਕ ਵੀ ਦਿਨ ਨਹੀਂ
1	2	3	4	5	6	7	8

4. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਕਸਰਤ ਕੀਤੀ ਸੀ (ਜਿਵੇਂ ਕਿ ਸੈਰ ਕਰਨੀ ਆਦਿ) ਜੋ ਕਿ ਘੱਟੋ ਘੱਟ 20 ਮਿੰਟ ਵਾਸਤੇ ਹੋਵੇ?

ਸਾਰੇ 7 ਦਿਨ	6 ਦਿਨ	5 ਦਿਨ	4 ਦਿਨ	3 ਦਿਨ	2 ਦਿਨ	1 ਦਿਨ	ਇੱਕ ਵੀ ਦਿਨ ਨਹੀਂ
1	2	3	4	5	6	7	8

5. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਆਪਣੇ ਖੂਨ ਵਿੱਚ ਸ਼ੂਗਰ ਨੂੰ ਟੈਸਟ ਕੀਤਾ?

ਸਾਰੇ 7 ਦਿਨ	6 ਦਿਨ	5 ਦਿਨ	4 ਦਿਨ	3 ਦਿਨ	2 ਦਿਨ	1 ਦਿਨ	ਇੱਕ ਵੀ ਦਿਨ ਨਹੀਂ
1	2	3	4	5	6	7	8

6. ਸ਼ੂਗਰ ਦੀਆਂ ਦਵਾਈਆਂ ਗੋਲੀਆਂ ਨੂੰ ਕਿੰਨੀ ਵਾਰ ਖਾਣਾ ਤੁਹਾਨੂੰ ਔਖਾ ਜਾਂ ਮੁਸ਼ਕਲ ਲੱਗਦਾ ਹੈ?

ਕਦੇ ਵੀ ਨਹੀਂ	ਕਦੀ ਕਦੀ	ਅੱਧਾ ਸਮਾਂ	ਜ਼ਿਆਦਾਤਰ	ਹਰ ਵਕਤ
4	3	2	1	0

7. ਸ਼ੂਗਰ ਦੀਆਂ ਦਵਾਈਆਂ ਗੋਲੀਆਂ ਨਾਲ ਤੁਹਾਨੂੰ ਕਿੰਨੀ ਕੁ ਵਾਰ ਬੁਰਾ ਅਸਰ ਹੁੰਦਾ ਹੈ?

ਕਦੇ ਵੀ ਨਹੀਂ	ਕਦੀ ਕਦੀ	ਅੱਧਾ ਸਮਾਂ	ਜ਼ਿਆਦਾਤਰ	ਹਰ ਵਕਤ
4	3	2	1	0

8. ਸ਼ੂਗਰ ਦੀਆਂ ਦਵਾਈਆਂ ਗੋਲੀਆਂ ਨੂੰ ਤੁਸੀਂ ਅਕਸਰ ਕਿੰਨੀ ਕੁ ਵਾਰ ਖਾਣਾ ਭੁੱਲ ਜਾਂਦੇ ਹੋ?

ਕਦੇ ਵੀ ਨਹੀਂ	ਕਦੀ ਕਦੀ	ਅੱਧਾ ਸਮਾਂ	ਜ਼ਿਆਦਾਤਰ	ਹਰ ਵਕਤ
4	3	2	1	0

9. ਤੁਸੀਂ ਅਕਸਰ ਕਿੰਨੀ ਕੁ ਵਾਰ ਆਪਣੀ ਸ਼ੂਗਰ ਦੀ ਡਾਕਟਰੀ ਅਪਾਇੰਟਮੈਂਟ ਤੇ ਜਾਣਾ ਭੁੱਲ ਜਾਂਦੇ ਹੋ?

ਕਦੇ ਨਹੀਂ	ਬਹੁਤ ਘੱਟ	ਕਦੀ ਕਦੀ	ਅਕਸਰ ਹੀ	ਹਮੇਸ਼ਾ
4	3	2	1	0

Self Care Activity group 2: Diet plus insulin injection(s)

ਹੁਣ ਮੈਂ ਤੁਹਾਨੂੰ ਕੁੱਝ ਪ੍ਰਸ਼ਨ ਪੁੱਛਾਂਗਾ/ਗੀ ਜੋ ਕਿ ਤੁਸੀਂ ਹਰ ਰੋਜ਼ ਆਪਣੀ ਸ਼ੂਗਰ ਨੂੰ ਠੀਕ ਰੱਖਣ ਲਈ ਕਰਦੇ ਹੋ। ਇਹ ਪਿਛਲੇ ਹਫ਼ਤੇ ਦੇ ਬਾਰੇ ਹੀ ਹੈ। ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਆਪਣੀ ਸ਼ੂਗਰ ਨੂੰ ਠੀਕ ਰੱਖਣ ਲਈ ਕੀ ਕੀਤਾ, ਜਿਨ੍ਹਾਂ ਦਿਨਾਂ ਤੁਸੀਂ ਬਿਮਾਰ ਸੀ ਉਨ੍ਹਾਂ ਨੂੰ ਛੱਡਣਾ ਹੈ ਜੋ ਤੁਹਾਡੀ ਹਾਲਤ ਨੂੰ ਠੀਕ ਤਰ੍ਹਾਂ ਧਿਆਨ ਕਰਦਾ ਹੈ।

ਪਿਛਲੇ 7 ਦਿਨਾਂ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਤਾਜ਼ਾ ਫਲ, ਤਾਜ਼ਾ ਸਬਜ਼ੀਆਂ

1. ਸਾਬਤ ਦਾਲਾਂ ਵਾਲੀ ਖੁਰਾਕ, ਜਿਵੇਂ ਰੋਟੀਆਂ ਅਤੇ ਮਟਰ ਆਪਣੇ ਖਾਣੇ ਵਿੱਚ ਵਰਤੇ ਹਨ?

ਸਾਰੇ 7 ਦਿਨ 8	6 ਦਿਨ 7	5 ਦਿਨ 6	4 ਦਿਨ 5	3 ਦਿਨ 4	2 ਦਿਨ 3	1 ਦਿਨ 2	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 1

2. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਕਿੰਨੀ ਵਾਰ ਤੁਸੀਂ ਆਪਣੇ ਭੋਜਨ ਵਿੱਚ ਪਿਉਂਤੇ, ਮੱਖਣ, ਆਈਸ-ਕਰੀਮ, ਤੇਲ, ਘਿਓ, ਨਾਰੀਅਲ ਅਤੇ ਚੀਜ਼, ਮੇਯੋ, ਸਮੋਸੇ, ਤਲੇ ਹੋਏ ਭੋਜਨ ਜਿਵੇਂ ਕਿ ਭਟੂਰੇ, ਮੱਖਣ ਵਿੱਚ ਬਣਾਏ ਪਕਵਾਨ, ਪਰੌਂਠੇ ਉੱਪਰ ਘਿਓ ਵਾਲੀ ਤੜਕਾ, ਮੀਟ ਉੱਪਰ ਵਾਲੀ ਚਰਬੀ ਜਾਂ ਮੀਟ ਦੇ ਉੱਪਰ ਚਮੜੀ ਸਮੇਤ ਖਾਧੀ ਹੈ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

3. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਆਪਣੇ ਖਾਣੇ ਵਿੱਚ ਕਿੰਨੀ ਵਾਰ ਮਿਠਾਈ, ਮਿੱਠਾ ਜਿਵੇਂ ਕਿ ਲੱਡੂ, ਜਲੇਬੀ, ਗਾਜਰ ਹਲਵਾ, ਮਿਠਾਈ, ਮਿਠਾਈ, ਖੀਰ, ਕੇਕ, ਕੁਕੀ, ਗੈਸ ਵਾਲੀ ਡਰਿੰਕ ਅਤੇ ਡਰਿੰਕ ਆਦਿ ਖਾਧਾ ਹੈ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

4. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਕਸਰਤ ਕੀਤੀ ਸੀ (ਜਿਵੇਂ ਕਿ ਸੈਰ ਕਰਨੀ ਜਾਣਾ) ਜੋ ਕਿ ਘੱਟੋ ਘੱਟ 20 ਮਿੰਟ ਵਾਸਤੇ ਹੋਵੇ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

5. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਆਪਣੇ ਖੂਨ ਵਿੱਚ ਸ਼ੂਗਰ ਨੂੰ ਟੈਸਟ ਕੀਤਾ ਹੈ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

6. ਸ਼ੂਗਰ ਦੇ ਟੀਕੇ ਇਨਸੂਲਿਨ ਦੇ ਟੀਕੇ ਨੂੰ ਲਗਾਉਣਾ ਕਿੰਨੀ ਵਾਰ ਤੁਹਾਨੂੰ ਔਖਾ ਜਾਂ ਮੁਸ਼ਕਲ ਲਗਾ?

ਕਦੇ ਵੀ ਨਹੀਂ 4	ਕਦੀ ਕਦੀ 3	ਅੱਧਾ ਸਮਾਂ 2	ਜ਼ਿਆਦਾਤਰ 1	ਹਰ ਵਕਤ 0

7. ਇਨਸੂਲਿਨ ਦੇ ਟੀਕਿਆਂ ਨਾਲ ਤੁਹਾਨੂੰ ਕਿੰਨੀ ਕੁ ਵਾਰ ਦੁੱਖ ਮਹਿਸੂਸ ਹੁੰਦਾ ਹੈ?

ਕਦੇ ਵੀ ਨਹੀਂ 4	ਕਦੀ ਕਦੀ 3	ਅੱਧਾ ਸਮਾਂ 2	ਜ਼ਿਆਦਾਤਰ 1	ਹਰ ਵਕਤ 0

8. ਸ਼ੂਗਰ ਦੇ ਟੀਕੇ ਇਨਸੂਲਿਨ ਦੇ ਟੀਕਿਆਂ ਨੂੰ ਤੁਸੀਂ ਆਮ ਤੌਰ ਕਿੰਨੀ ਕੁ ਵਾਰ ਲੈਣਾ ਭੁੱਲ

ਕਦੇ ਵੀ ਨਹੀਂ 4	ਕਦੀ ਕਦੀ 3	ਅੱਧਾ ਸਮਾਂ 2	ਜ਼ਿਆਦਾਤਰ 1	ਹਰ ਵਕਤ 0

9. ਤੁਸੀਂ ਆਮ ਤੌਰ ਕਿੰਨੀ ਕੁ ਵਾਰ ਆਪਣੀ ਸ਼ੂਗਰ ਦੀ ਦਵਾਈ ਅਪਾਇੰਟਮੈਂਟ ਤੇ ਜਾਣਾ ਭੁੱਲ

ਕਦੀ ਨਹੀਂ 4	ਬਹੁਤ ਘੱਟ 3	ਕਦੀ ਕਦੀ 2	ਆਮ ਤੌਰ ਤੇ 1	ਹਮੇਸ਼ਾ 0

ਹੁਣ ਮੈਂ ਤੁਹਾਡੇ ਕੋਲੋਂ ਪੁਛਣਾ ਚਾਹੁੰਦਾ/ਦੀ ਹਾਂ ਕਿ ਤੁਸੀਂ ਜਿਸ ਤਰ੍ਹਾਂ ਆਪਣੀ ਖੁਰਾਕ ਨੂੰ ਠੀਕ ਕਰਨ, ਵਾਧੂ ਵਿੱਚ ਘਟਣੇ ਤੇ, ਬਲੱਡ ਪ੍ਰੈਸ਼ਰ ਦਵਾਈਆਂ ਦੀ ਕਰਨ, ਰਹੇ ਹੋ। ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਆਪਣੀ ਖੁਰਾਕ ਨੂੰ ਠੀਕ ਕਰਨ, ਵਾਧੂ ਵਿੱਚ ਕੀਤਾ, ਦਿਨਾਂ ਵਿੱਚੋਂ ਤੁਸੀਂ ਕਿੰਨੇ ਤਰੀਕੇ ਨੂੰ ਵਰਤਣਾ ਹੈ ਤੇ ਤੁਹਾਡੀ ਸਿਹਤ ਨੂੰ ਵਧੀਆ ਕਰਨ ਵਿੱਚ ਮਦਦ ਕਰਦਾ ਹੈ।

ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਤਾਜ਼ੇ ਫਲ, ਤਾਜ਼ੀ ਸਬਜ਼ੀਆਂ,
1. ਸਾਬਤ ਦਾਣਿਆਂ ਵਾਲੀ ਖੁਰਾਕ, ਸੁੱਕੇ ਬੀਨਜ਼ ਅਤੇ ਮਟਰ ਆਪਣੇ ਖਾਣ ਵਿੱਚ ਵਰਤੇ ਹਨ?

ਸਾਰੇ 7 ਦਿਨ 8	6 ਦਿਨ 7	5 ਦਿਨ 6	4 ਦਿਨ 5	3 ਦਿਨ 4	2 ਦਿਨ 3	1 ਦਿਨ 2	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 1

2. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਆਪਣੇ ਭੋਜਨ ਵਿੱਚ ਘਿਉ, ਮੱਖਣ, ਆਈਸ-ਕਰੀਮ, ਤੇਲ, ਬਦਾਮ, ਕਾਜੂ ਅਤੇ ਪਨੀਰ, ਸਾਲਨ, ਐਵੋਕੈਡੋ, ਤਲੇ ਹੋਏ ਭੋਜਨ ਜਿਵੇਂ ਕਿ ਪਕੌੜੇ, ਮੱਖਣ ਵਿੱਚ ਬਣਾਏ ਬਿਸਕੁਟ ਜਾਂ ਕੇਕ, ਸਲਾਦ ਉਪਰ ਪਾਉਣ ਵਾਲੀ ਡਰੈਸਿੰਗ, ਮੀਟ ਉਪਰ ਚਰਬੀ ਜਾਂ ਮੀਟ ਦੇ ਉਪਰ ਦਾ ਸਵਾਦ ਲੈਣ ਦੇ ਖਾਣੀ ਹੈ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਆਪਣੇ ਖਾਣੇ ਵਿੱਚ ਕਿੰਨੀ ਵਾਰ ਮਿਠਾਈ, ਕੇਕ
3. ਜਿਵੇਂ ਕਿ ਲੱਡੂ, ਜਲੇਬੀ, ਗਾਜਰ ਹਲਵਾ, ਮਿਠਾਈ, ਬਿਸਕੁਟ, ਪਾਈ, ਕੇਕ, ਖੰਡ, ਖੰਡ ਵਾਲੀ ਡਰਿੰਕ ਅਤੇ ਕੁਕੀਜ਼ ਆਦਿ ਖਾਧਾ ਹੈ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

4. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਕਸਰਤ ਕੀਤੀ ਸੀ (ਜਿਵੇਂ ਕਿ ਸੈਰ ਕਰਨੀ ਆਦਿ) ਜੋ ਕਿ ਘੱਟ ਘੱਟ 20 ਮਿੰਟ ਵਾਸਤੇ ਹੋਵੇ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

5. ਪਿਛਲੇ 7 ਦਿਨਾਂ ਦੇ ਵਿੱਚ ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਆਪਣੇ ਖੂਨ ਵਿੱਚ ਸ਼ੂਗਰ ਨੂੰ ਟੈਸਟ ਕੀਤਾ?

ਸਾਰੇ 7 ਦਿਨ 1	6 ਦਿਨ 2	5 ਦਿਨ 3	4 ਦਿਨ 4	3 ਦਿਨ 5	2 ਦਿਨ 6	1 ਦਿਨ 7	ਕਿਸੇ ਵੀ ਦਿਨ ਨਹੀਂ 8

6. ਬਲੱਡ ਪ੍ਰੈਸ਼ਰ ਦੀਆਂ ਦਵਾਈਆਂ ਗੋਲੀਆਂ ਨੂੰ ਕਿੰਨੀ ਵਾਰ ਖਾਣਾ ਤੁਹਾਨੂੰ ਔਖਾ ਜਾਂ ਮੁਸ਼ਕਿਲ ਲੱਗਦਾ ਹੈ?

ਕਦੇ ਵੀ ਨਹੀਂ 4	ਕਦੀ ਕਦੀ 3	ਅੱਧਾ ਸਮਾਂ 2	ਜ਼ਿਆਦਾਤਰ 1	ਹਰ ਵਕਤ 0

7. ਬਲੱਡ ਪ੍ਰੈਸ਼ਰ ਦੀਆਂ ਦਵਾਈਆਂ ਗੋਲੀਆਂ ਨਾਲ ਤੁਹਾਨੂੰ ਕਿੰਨੀ ਕੁ ਵਾਰ ਉਲਟਾ ਅਸਰ ਹੋਇਆ ਹੈ?

ਕਦੇ ਵੀ ਨਹੀਂ 4	ਕਦੀ ਕਦੀ 3	ਅੱਧਾ ਸਮਾਂ 2	ਜ਼ਿਆਦਾਤਰ 1	ਹਰ ਵਕਤ 0

8. ਬਲੱਡ ਪ੍ਰੈਸ਼ਰ ਦੀਆਂ ਦਵਾਈਆਂ ਗੋਲੀਆਂ ਨੂੰ ਤੁਸੀਂ ਆਸਾਨੀ ਨਾਲ ਕਿੰਨੀ ਕੁ ਵਾਰ ਖਾਣਾ ਭੁੱਲ ਜਾਂਦੇ ਹੋ?

ਕਦੇ ਵੀ ਨਹੀਂ 4	ਕਦੀ ਕਦੀ 3	ਅੱਧਾ ਸਮਾਂ 2	ਜ਼ਿਆਦਾਤਰ 1	ਹਰ ਵਕਤ 0

9. ਤੁਸੀਂ ਸਾਰਥਕ ਕਿੰਨੀ ਕੁ ਵਾਰ ਆਪਣੀ ਖੁਰਾਕ ਦੀ ਕੀਤੀ ਅਪੁਆਇੰਟਮੈਂਟ ਤੇ ਜਾਣਾ ਭੁੱਲ ਜਾਂਦੇ ਹੋ?

ਕਦੇ ਨਹੀਂ 4	ਬਹੁਤ ਘੱਟ 3	ਕਦੀ ਕਦੀ 2	ਅਕਸਰ ਹੀ 1	ਹਮੇਸ਼ਾ 0

Appendix I

Interview Schedule – Pakistani version

انٹرویو شیڈول

اس انٹرویو میں میں آپ سے ذیابیطس (شکر) کی بیماری کے متعلق کچھ سوالات پوچھوں گی۔ کوئی جواب صحیح یا غلط نہیں ہو گا۔ یہ صرف ذیابیطس کے متعلق آپ کے علم کا جائزہ ہوگا۔ البتہ یہ نہایت ضروری ہے کہ آپ ہر سوال کا جواب اپنے صحیح علم، احساس اور یقین سے دیں۔

اگر کوئی سوال اچھی طرح سمجھ میں نہ آئے تو ضرور پوچھ لینا۔ آپ کے جوابات کو انتہائی پوشیدہ رکھا جائے گا اور یہ ایک گمنام سوالنامہ ہے۔ اس مطالعہ سے حاصل ہونے والی معلومات سے ہمیں یہ سمجھنے میں مدد ملے گی کہ لوگ اپنی ذیابیطس کی دیکھ بھال کس طرح کرتے ہیں اور غالباً یہ معلومات مریضوں کی دیکھ بھال کے منصوبے تیار کرنے میں بھی مددگار ثابت ہو گی جو بعض مریضوں کی ضروریات کو مدِ نظر رکھتے ہوئے تیار کئے جائیں گے۔ شکریہ

سب سے پہلے میں آپ سے آپ کا پس منظر جاننے کے لیے کچھ سوالات پوچھوں گی۔

۱	مرد	
۲	عورت	

۱۔ آپکی تاریخ پیدائش کیا ہے؟

۲۔ آپکی فیملی کا تعلق کس ملک سے ہے؟

۱۔ برطانیہ	۲۔ انڈیا	۳۔ پاکستان	۴۔ بنگلہ دیش	۵۔ کوئی اور ____

آپکے والد کا تعلق کس ملک سے ہے ____

آپکی والدہ کا تعلق کس ملک سے ہے ____

انٹرویو لینے والے کے لئے نوٹس

اگر تیسرے سوال کا جواب برطانیہ نہیں تو سوال نمبر ۳۰۱ پوچھئے۔

۳۰۱۔ آپ برطانیہ میں کتنے عرصے سے رہتے ہیں؟

۴۔ آپ کون سی زبان بولنے میں زیادہ آسانی محسوس کرتے ہیں۔

۱۔ انگریزی
۲۔ پنجابی
۳۔ گجراتی
۴۔ پاکستانی اردو
۵۔ بنگالی
۶۔ سلہٹ
۷۔ میرپوری
۸۔ کوئی اور ــــ

۵۔ کیا آپ اپنے مذہب کے بارے میں بتا سکتے ہیں؟ اگر آپ کسی مذہب کو مانتے ہیں۔

۱۔ عیسائیت
۲۔ ہندوازم
۳۔ اسلام
۴۔ سکھ ازم
۵۔ بدھ ازم
۶۔ کوئی اور

۶۔ آپکی ازدواجی حیثیت کیا ہے؟

۱۔ غیر شادی شدہ	۲۔ شادی شدہ	۳۔ طلاق شدہ	۴۔ علیحدہ	۵۔ بیوہ / رنڈوا	۶۔ کوئی اور

۷۔ آپکے بچے کتنے ہیں اور انکی عمریں کیا ہیں؟

۸۔ کیا آپ مہربانی کر کے ان لوگوں کی تفصیل بتا سکتے ہیں جو آپکے ساتھ گھر میں رہتے ہیں اور ان سے آپ کا رشتہ کیا ہے؟

۹۔ کیا اب آپ اپنی تعلیم کے بارے میں بتا سکتے ہیں؟ نیچے دیے گے درجوں میں سے کون سا زیادہ مناسب ہوگا۔

۱۔ بالکل ان پڑھ	۲۔ پانچ یا پانچ سے کم مثلاً پرائمری	۳۔ پانچ سال سے زیادہ مثلاً سیکنڈری یا ہائی	۴۔ اعلیٰ تعلیم مثلاً کالج یا یونیورسٹی

۱۰۔ آپکی کام کاج کی موجودہ صورت حال کیا ہے؟

۱۔ کل وقتی ملازمت	۲۔ جز وقتی ملازمت	۳۔ بیکار	۴۔ گھریلو بیوی	۵۔ پنشن شدہ	۶۔ کوئی اور ـــــ

۱۱۔ کیا آپ اپنی ماہانہ تنخواہ بتا سکتے ہیں؟ نیچے دیے گے درجوں میں سے کون سا زیادہ مناسب ہوگا

۱۔ کچھ بھی نہیں	۲۔ ۱ پونڈ سے ۵۰۰ پونڈ تک	۳۔ ۵۰۱ پونڈ سے ۱۰۰۰ پونڈ تک	۴۔ ۱۰۰۱ سے ۱۵۰۰ تک	۵۔ یا پھر ۱۵۰۱ سے زیادہ

۱۲۔ کیا آپ بتا سکتے ہیں کہ آپ کے گھر میں سونے کے کمرے کتنے ہیں؟

اب میں آپ سے چند عام سوالات جو آپکی ذیابیطس سے متعلق ہیں پوچھنا چاہوں گا/گی۔

۱۔ کیا آپ سگریٹ پیتے ہیں؟

۱۔ ہاں	
۲۔ نہیں	

۱و۱۔ آپ کتنے عرصے سے سگریٹ پیتے ہیں؟

۲۔ کیا آپ سپاری چباتے ہیں؟

۱۔ ہاں	
۲۔ نہیں	

۱و۱۔ کتنے عرصے سے چباتے ہیں؟

۱و۲۔ آپ تقریباً کتنی سپاریاں روزانہ چباتے ہیں؟

۳۔ آپ کا وزن کتنا ہے؟

۳ا۔ آپ کا قد کتنا ہے؟

۴۔ آپکی ذیابیطس کی تشخیص کتنے عرصے سے ہوئی ہے؟

۵۔ ذیابیطس کو قابو میں رکھنے اور دیکھ بھال کرنے کے چار طریقے ہیں۔ کیا آپ بتا سکتے ہیں کہ آپکو کون سے طریقے پر عمل کرنے کا مشورہ دیا گیا ہے؟

۱۔ صرف کھانے کا پرہیز	۲۔ پرہیز کے ساتھ گولیاں	۳۔ پرہیز کے ساتھ انسولین	۴۔ پرہیز گولیاں اور انسولین

انٹرویو لینے والے کے لئے نوٹس

درج ذیل سوالات (۶ سے ۸) کے جوابات سوال نمبر پانچ کے جوابات کے مطابق ہوں گے۔

[چھٹا سوال جواب نمبر ۲ کے مطابق ہے یعنی پرہیز اور گولیاں]

۶۔ آپ کو روزانہ کتنی گولیاں کھانے کا مشورہ دیا گیا ہے؟

[ساتواں سوال تیسرے جواب کے مطابق ہے یعنی پرہیز اور انسولین]

۷۔ آپ کو روزانہ انسولین کے کتنے ٹیکے لگوانے کا مشورہ دیا گیا ہے؟

[آٹھویں سوال کا تعلق چوتھے جواب سے ہے یعنی پرہیز گولیاں اور انسولین]

۸۔ آپ کو کتنی گولیاں اور کتنے انسولین کے ٹیکے لگانے کا مشورہ دیا گیا ہے؟

۹۔ کیا آپکو بلڈ پریشر کنٹرول کرنے کے لئے گولیاں کھانے کا مشورہ دیا گیا ہے؟ کیا آپ بتا سکتے ہیں کہ آپ روزانہ کتنی گولیاں لیتے ہیں؟

۱۰۔ ذیابیطس کی دیکھ بھال تین مختلف طریقوں سے مہیا ہوتی ہے۔ کیا آپ بتا سکتے ہیں کہ ان میں سے کون کون سے دیکھ بھال مہیا کرنے والے آپ کی بیماری میں شامل ہیں؟

۱۔ آپ کا ڈاکٹر	۲۔ ڈاکٹر اور ہسپتال	۳۔ صرف ہسپتال

۱۱۔ کیا آپ کی فیملی میں کسی اور کو ذیابیطس ہے؟ اور ان سے آپ کا کیا رشتہ ہے؟

۱۔ ہاں	۲۔ نہیں

۱۲۔ کیا آپ ذیابیطس کے علاج میں مرد یا عورت ڈاکٹر کو ترجیح دیتے ہیں؟ براۓ کرم وجہ بیان کیجئے؟

۱۔ بالکل نہیں	۲۔ ہاں

۱۳۔ کیا آپ بتا سکتے ہیں کہ آپ کے ڈاکٹر کا تعلق کس ملک سے ہے؟ نیچے دیے گۓ پانچ درجوں میں سے کونسا زیادہ مناسب ہوگا۔

۱۔ یورپین	۲۔ انڈین	۳۔ پاکستانی	۴۔ بنگلہ دیشی	۵۔ کسی دوسرے ملک سے____

۱۴۔ کیا آپ اپنے علاج کے لیے اپنی قوم یا نسل کے ڈاکٹر کو ترجیح دیتے ہیں؟ وجہ بیان کریں۔

۱۔ بالکل نہیں	۲۔ ہاں

۱۵۔ آپ کو ذیابیطس کی اپائنٹمنٹ پر پہنچنے میں تقریباً کتنا وقت لگتا ہے؟

۱۶۔ آپ اپائنٹمنٹ پر پہنچنے کے لیے کون سی سواری استعمال کرتے ہیں؟

۱۔ اپنی گاڑی	۲۔ پبلک ٹرانسپورٹ	۳۔ کسی اور ذریعے سے____

۱۷۔ کیا آپ بتا سکتے ہیں کہ کون کون سے ماہرین صحت آپ کو ذیابیطس کے متعلق معلومات پہنچانے میں شامل رہے ہیں؟ جیسے نرسیں، ماہر خوراک، پاؤں کا معالج وغیرہ۔

۱۔ نرسیں	۲۔ ڈاکٹر	۳۔ کوئی اور____

۱۸۔ آپ کو کب آخری مرتبہ ذیابیطس کی دیکھ بھال کے متعلق معلومات ملی تھی؟

۱۔ ایک سال کے عرصہ میں	۲۔ ایک سال سے زائد عرصہ میں

۱۹۔ جب سے آپکی ذیابیطس کی تشخیص ہوئی ہے کیا آپکو کسی قسم کی پیچیدگی کا سامنا کرنا پڑا ہے؟

۱۔ بینائی کا دھندلا پن	ہاں	نہیں
۲۔ موتیا بند	ہاں	نہیں
۳۔ گردوں کی تکلیف	ہاں	نہیں
۴۔ اعصابی بیماریاں	ہاں	نہیں
۵۔ جنسی مسائل مثلاً نامردی وغیرہ	ہاں	نہیں
۶۔ جلد کے مسائل مثلاً جلد کا سرخ ہونا، پتلا ہونا اور خارش وغیرہ	ہاں	نہیں
۷۔ دل کی تکلیف	ہاں	نہیں
۸۔ پاؤں کی بیماریاں	ہاں	نہیں
۹۔ جسم کے کسی اعضا کا کاٹ دیا جانا	ہاں	نہیں

اگلے سوالات ڈاکٹری ادویات کے علاوہ علاج کی قسموں کے متعلق ہیں۔

۱۔ ذیابیطس کے علاج کے لئے ڈاکٹری علاج کے علاوہ بھی کئی متبادل علاج ہیں۔ کیا آپ نے درج ذیل میں سے کوئی آزمایا ہے۔

۱۔ جڑی بوٹیوں سے	ہاں	نہیں
۲۔ اروما تھراپی مثلاً دھونی، خوشبودار بوٹیاں، عطر اور تیل وغیرہ	ہاں	نہیں
۳۔ آئیورویدک ادویات مثلاً دھاتوں کا استعمال	ہاں	نہیں
۴۔ روحانی علاج مثلاً دعا اور دوسرے مذہبی عقائد وغیرہ	ہاں	نہیں
۵۔ قدرتی اور مفید غذائیں	ہاں	نہیں
۶۔ ہومیوپیتھی یا دوسری قدرتی ادویات	ہاں	نہیں
۷۔ ٹرانسڈینٹل میڈیٹیشن یعنی مراقبے وغیرہ	ہاں	نہیں
۸۔ یوگا	ہاں	نہیں

انٹرویو لینے والے کے لئے نوٹس

اگر سوال نمبر ایک کا جواب ہاں ہے تو سوال نمبر ایک تا چھ پوچھیے۔ (س ۲ تا س ۶)

۲۔ کیا آپ ذیابیطس کے علاج میں قدرتی پودوں اور جڑی بوٹیوں کا استعمال کرتے ہیں؟ مثلاً کریلا وغیرہ۔

ہاں	نہیں	جڑی بوٹیوں کے نام

۳۔ سوال نمبر دو سے، آپ ذیابیطس کے علاج میں کتنی کثرت سے ادویاتی پودوں کا استعمال کرتے ہیں؟

۵	بالکل نہیں
۱	مہینے میں ایک مرتبہ
۲	ہفتے میں ایک مرتبہ
۳	روزانہ
۴	اس کے علاوہ

۴۔ کیا آپ نے اپنے ڈاکٹر یا دوسرے ماہرین صحت کو بتایا ہے کہ آپ قدرتی جڑی بوٹیوں کا استعمال کرتے ہیں؟

بالکل نہیں	ہاں	کبھی نہیں

۵۔ کیا آپ اپنے دوستوں کو ادویاتی پودوں کے استعمال کا مشورہ دیں گے؟

۱۔ ہاں	۲۔ نہیں

۶۔ آپ نے اپنے ادویاتی پودوں کا استعمال کس طرح دریافت کیا؟

۱۔ اپنے یا فیملی کے علم سے	
۲۔ دوستوں یا کنبے کے افراد کے مشورے سے	
۳۔ جڑی بوٹیوں کے معالج کے مشورے سے	
۴۔ میڈیکل کے عملے کے مشورے سے	
۵۔ میڈیا کے ذریعے مثلاً اخبارات، ٹی وی یا ریڈیو	
۶۔ یا کسی اور ذریعے سے	

اگلے سوالات پچھلے سوالات سے مختلف ہیں۔ ان سوالات میں آپکی رائے جاننے کی کوشش کی جائے گی کہ آپ سختی سے غیر رضامند، صرف غیر رضامند، غیر فیصلہ شدہ، رضامند یا بالکل رضامند ہیں۔

جیساکہ پہلے کہا جا چکا ہے کہ کوئی سوال صحیح یا غلط نہیں۔ آپ اپنی رائے کا حق رکھتے ہیں بہر حال یہ نہائت ضروری ہے کہ ہر سوال کا جواب اپنے صحیح علم، احساس اور یقین سے دیں۔

<u>انٹرویو لینے والے کے لئے نوٹس</u>

برائے مہربانی سوال پوچھنے سے پہلے سوالنامے کا پیمانہ شریک گفتگو کو دیں۔

۱۔ ذیابیطس کی وجہ سے میں اپنے آپ کو بالکل بیمار نہیں سمجھتا / سمجھتی۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۲۔ مجھے ذیابیطس سے نفرت ہے۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۳۔ ذیابیطس نے میری زندگی پر بُرا اثر ڈالا ہے۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۴۔ میں ذیابیطس کی وجہ سے اپنے آپ کو دوسروں سے مختلف سمجھتا ہوں۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۵۔ لوگ سمجھتے ہیں کہ میں ذیابیطس کی وجہ سے اُن سے مختلف ہوں۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۶۔ ذیابیطس کی وجہ سے معمول کی زندگی گزارنا مشکل ہے۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۷۔ اگر مجھے ذیابیطس نہ ہوتی تو میری زندگی اس سے کہیں بہتر ہوتی۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۸۔ میں اکثر محسوس کرتا ہوں کہ مجھے ذیابیطس کی بیماری نہیں ہونی چاہیے تھی۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۹۔ ذیابیطس نے میری زندگی پر کوئی اثر نہیں ڈالا۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۱۰۔ میں ذیابیطس کی وجہ سے سخت پریشان رہتا/رہتی ہوں۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۱۱۔ لوگ میری ذیابیطس کی مشکلات کو نہیں سمجھتے۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۱۲۔ ذیابیطس کو اچھی طرح قابو میں رکھا جائے تو معمولات زندگی متاثر نہیں ہوتے۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۱۳۔ میں اپنی ذیابیطس کی دیکھ بھال اچھی طرح کر سکتا/سکتی ہوں۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۱۴۔ جب سے مجھے ذیابیطس ہوئی ہے میری شخصیت بدل گئی ہے۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۱۵۔ ذیابیطس ہونے کی وجہ سے مجھے اچھا بھلا انسان نہیں سمجھا جاتا۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

۱۶۔ ذیابیطس کی بیماری کی وجہ سے میں بہت سے کام نہیں کر سکتا۔

۱۔ سختی سے غیر رضامند	۲۔ غیر رضامند	۳۔ غیر فیصلہ شدہ	۴۔ رضامند	۵۔ بالکل رضامند

اب ہم آپ سے مغربی طریقہ علاج ،ادویات ،دیکھ بھال ،طبی معلومات اور مشورے سے متعلق سوالات پوچھیں گے۔
یہ سوالات پچھلے سوالات سے ملتے جلتے ہیں۔آپ ان سوالات کے جوابات اپنے علم کے مطابق چن سکتے ہیں۔
ایک بار پھر کوئی جواب صحیح یا غلط نہیں ہوگا آپ اپنی رائے کا پورا حق رکھتے ہیں۔اور جب آپ تیار ہونگے آپ سے پہلا سوال کیا جائے گا۔

انٹرویو لینے والے کے لئے نوٹس

سوال پوچھنے سے پہلے سوالنامے کا پیمانہ شریک گفتگو کو دیں۔

۱۔ کیا آپ دیئے گے انتخابات سے ایک جواب چن سکتے ہیں ؟ انتخابات یہ ہیں بہت تکلیف دہ ، تکلیف دہ ، غیر فیصلہ شدہ ،آرام دہ یا بالکل غیر آرام دہ۔

آپ کو مجوزہ طریقہ علاج کتنا آرام دہ لگتا ہے ؟

۰۔ بہت تکلیف دہ	۱۔ تکلیف دہ	۲۔ غیر فیصلہ شدہ	۳۔ آرام دہ	۴۔ بہت آرام دہ

۲۔ کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں ؟ انتخابات یہ ہیں بالکل غیر مطمئن ، غیر مطمئن ، غیر فیصلہ شدہ ، مطمئن اور بالکل مطمئن۔

آپ علاج سے اپنے آپ کو کتنا مطمئن محسوس کرتے ہیں ؟

۰۔ بالکل غیر مطمئن	۱۔ غیر مطمئن	۲۔ غیر فیصلہ شدہ	۳۔ مطمئن	۴۔ بالکل مطمئن

کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں ؟ انتخابات یہ ہیں عمل کرنا بہت مشکل ہے ، عمل کرنا مشکل ہے ، غیر فیصلہ شدہ ، عمل کرنا آسان ہے اور عمل کرنا بہت آسان ہے۔

۰۔ عمل کرنا بہت مشکل ہے	۱۔ عمل کرنا مشکل ہے	۲۔ غیر فیصلہ شدہ	۳۔ عمل کرنا آسان ہے	۴۔ عمل کرنا بہت آسان ہے

۴۔ آپ کو ڈاکٹر کے نسخے پر ملنے والی ادویات کی افادیت کی کتنی سمجھ ہے ؟ صفر سے دس تک نمبروں سے کتنے نمبر دیں گے۔

۰	۱	۲	۳	۴	۵	۶	۷	۸	۹	۱۰

۵۔ کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ مجھے بالکل ضرورت نہیں، تھوڑی سی ہے، کافی زیادہ ہے، بہت زیادہ ہے،

بہت ہی زیادہ ہے۔
کیا آپ سمجھتے ہیں کہ آپ کو اس علاج کے متعلق مزید مشورہ کی ضرورت ہے؟

۰۔ نہیں، مجھے بالکل ضرورت نہیں	۱۔ تھوڑی سی ہے	۲۔ کافی زیادہ ہے	۳۔ بہت زیادہ ہے	۴۔ بہت ہی زیادہ ہے

۶۔ کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل نہیں، کبھی کبھار، بعض اوقات، اکثر اوقات اور ہر وقت۔

کیا آپ کو ادویات لینا ناخوشگوار لگتا ہے؟

۰۔ بالکل نہیں	۱۔ کبھی کبھار	۲۔ بعض اوقات	۳۔ اکثر اوقات	۴۔ ہر وقت

۷۔ کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل نہیں، کبھی کبھار، بعض اوقات، اکثر اوقات اور ہر وقت۔

کیا آپ کی خواہش ہے کہ آپ کو ڈاکٹری نسخہ پر ملنے والی ادویات کے علاوہ کسی اضافی علاج کی ضرورت ہے؟

۰۔ بالکل نہیں	۱۔ کبھی کبھار	۲۔ بعض اوقات	۳۔ اکثر اوقات	۴۔ ہر وقت

۸۔ کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل مطمئن نہیں، مطمئن نہیں، غیر فیصلہ شدہ، مطمئن، بالکل مطمئن
کیا آپ اپنی ہیلتھ کیئر ٹیم سے مطمئن ہیں؟

۰۔ بالکل مطمئن نہیں	۱۔ مطمئن نہیں	۲۔ غیر فیصلہ شدہ	۳۔ مطمئن	۴۔ بالکل مطمئن

۹۔ کیا آپ دیے گئے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بہت ناکافی، ناکافی، غیر فیصلہ شدہ، کافی، بہت کافی۔
کیا آپ محسوس کرتے ہیں کہ آپ کو ہیلتھ کیئر ٹیم سے کافی دیکھ بھال ملتی ہے؟

۰۔ بہت ناکافی	۱۔ ناکافی	۲۔ غیر فیصلہ شدہ	۳۔ کافی	۴۔ بہت کافی

۰۔ کیا آپ دیے گئے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل پُر سکون نہیں، پُر سکون نہیں، غیر فیصلہ شدہ، پُر سکون، بالکل پُر سکون۔

کیا آپ اپنی ذیابیطس کیئر ٹیم سے معمول کی ملاقات کے دوران پُر سکون محسوس کرتے ہیں؟

۰۔ بالکل پُر سکون نہیں	۱۔ پُر سکون نہیں	۲۔ غیر فیصلہ شدہ	۳۔ پُر سکون	۴۔ بالکل پُر سکون

۱۱۔ کیا آپ دیے گئے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ ضرور نہیں، غالباً نہیں، غیر فیصلہ شدہ، غالباً ہاں، ہاں ضرور۔

کیا آپ کسی اور ذیابیطس کے مریض کو یہ ذیابیطس ٹیم استعمال کرنے کا مشورہ دیں گے؟

۰۔ ضرور نہیں	۱۔ غالباً نہیں	۲۔ غیر فیصلہ شدہ	۳۔ غالباً ہاں	۴۔ ہاں ضرور۔

۱۲۔ کیا آپ دیے گئے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل مطمئن نہیں، مطمئن نہیں، غیر فیصلہ شدہ، مطمئن، بالکل مطمئن۔

کیا آپ اپنی صحت کی دیکھ بھال سے وابستہ ٹیم کے طبی مشورے سے مطمئن ہیں؟

۰۔ بالکل مطمئن نہیں	۱۔ مطمئن نہیں	۲۔ غیر فیصلہ شدہ	۳۔ مطمئن	۴۔ بالکل مطمئن

۱۳۔ کیا آپ دیے گئے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل مطمئن نہیں، مطمئن نہیں، غیر فیصلہ شدہ، مطمئن، بالکل مطمئن۔

کیا آپ ذیابیطس کے موجودہ سنٹر سے ملنے والی معلومات سے مطمئن ہیں؟

۰۔ بالکل مطمئن نہیں	۱۔ مطمئن نہیں	۲۔ غیر فیصلہ شدہ	۳۔ مطمئن	۴۔ بالکل مطمئن

۱۴۔ کیا آپ دیے گئے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل مفید نہیں، مفید نہیں، غیر فیصلہ شدہ، مفید، بہت مفید۔

صحت سے متعلق دوسری قسم کی معلومات آپ کی زبان میں کتنی مفید ہو گی؟

۰۔ بالکل مفید نہیں	۱۔ مفید نہیں	۲۔ غیر فیصلہ شدہ	۳۔ مفید	۴۔ بہت مفید

۱۵۔ کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں ۰۔ بالکل مفید نہیں، مفید نہیں، غیر فیصلہ شدہ، مفید، بہت مفید۔

آپ کی اپنی زبان بولنے والے عملے کا ہونا کتنا مفید ہے؟

۰۔ بالکل مفید نہیں	۱۔ مفید نہیں	۲۔ غیر فیصلہ شدہ	۳۔ مفید	۴۔ بہت مفید	۵۔ ان میں سے کوئی بھی نہیں

۱۶۔ کیا آپ دیے گے انتخابات سے ایک جواب چن سکتے ہیں؟ انتخابات یہ ہیں۔ بالکل غیر مطمئن، غیر مطمئن، غیر فیصلہ شدہ، مطمئن، بہت مطمئن۔

آپ ذیابیطس کے علاج میں استعمال ہونے والی سہولیات سے کتنے مطمئن ہیں؟

۰۔ بالکل غیر مطمئن	۱۔ غیر مطمئن	۲۔ غیر فیصلہ شدہ	۳۔ مطمئن	۴۔ بہت مطمئن

اگلے نسخے میں مختصر سے سوالات ہیں جن کے ذریعے ذیابیطس کے متعلق آپ کے علم کا اندازہ لگایا جا سکے گا۔ یہ پچیس (۲۵) سوالات ہیں اور ہر ایک کا ایک جواب ہے۔

آپ کا جواب "درست" ہو سکتا ہے اگر آپ سمجھتے ہیں کہ یہ وضاحت صحیح ہے۔ اور "غلط" ہو سکتا ہے اگر آپ سمجھتے ہیں کہ وضاحت صحیح نہیں۔ یا "معلوم نہیں" اگر آپ واقعی جواب نہیں جانتے۔

تاہم یہ نہائت ضروری ہے کہ آپ اپنی پوری کوشش سے جواب دیں۔ جونہی آپ تیار ہو گئے میں آپ سے سوال پوچھوں گا رگی۔

۱۔ ذیابیطس ایک بیماری ہے جس کی وجہ سے جسم خوراک کو اچھی طرح استعمال نہیں کر سکتا۔

درست	غلط	معلوم نہیں

۲۔ کثرت پیشاب، پیاس اور بھوک ذیابیطس کی زیادہ عام علامات ہیں۔

درست	غلط	معلوم نہیں

۳۔ ذیابیطس والے شخص کو روزانہ خون اور پیشاب میں شکر کی مقدار چیک کرنی چاہیے۔

درست	غلط	معلوم نہیں

۴۔ پیشاب میں تھوڑی سی گلوکوز کا ہونا عام (نارمل) ہے۔

درست	غلط	معلوم نہیں

۵۔ موٹاپے کا ذیابیطس سے کوئی تعلق نہیں۔

درست	غلط	معلوم نہیں

۶۔ فکر اور ذہنی دباؤ کی وجہ سے خون میں شکر کی مقدار پر اثر پڑ سکتا ہے۔

درست	غلط	معلوم نہیں

۷۔ جب آپ ذیابیطس کی گولیاں استعمال کرتے ہیں تو کھانے کی مقدار پر قابو رکھنا ضروری نہیں۔

درست	غلط	معلوم نہیں

۸۔ جسمانی ورزش سے خون میں شکر کی مقدار کم ہوتی ہے۔

درست	غلط	معلوم نہیں

۹۔ جسمانی کام کاج سے پیشاب میں شکر کی مقدار بڑھ سکتی ہے۔

درست	غلط	معلوم نہیں

۱۰۔ زیادہ دیر جسمانی مشقت سے خون میں شکر کی مقدار بڑھ جاتی ہے۔

درست	غلط	معلوم نہیں

۱۱۔ دن میں کھانا ہر چار پانچ گھنٹوں بعد باقاعدگی سے کھانا چاہیے۔

درست	غلط	معلوم نہیں

۱۲۔ ذیابیطس کے مریض شکر والی اشیاء کھا سکتے ہیں اگر دوا والی گولیاں یا انسولین باقاعدگی سے استعمال کرتے رہیں۔

درست	غلط	معلوم نہیں

۱۳۔ شکر والی خوراک عام طور پر خون میں شکر کی مقدار کو متاثر نہیں کرتی۔

درست	غلط	معلوم نہیں

۱۴۔ ذیابیطس کے لیے بنائی گئی خاص اشیاء کے استعمال سے وزن نہیں بڑھتا۔

درست	غلط	معلوم نہیں

۱۵۔ ذیابیطس والے لوگ جو اپنے آپ کو اچھا محسوس کرتے ہیں ان کے لیے باقاعدہ ڈاکٹری معائنے کی ضرورت نہیں۔

درست	غلط	معلوم نہیں

۱۶۔ باقاعدہ معائنے سے ابتدائی پیچیدگیوں کا پتہ چلایا جا سکتا ہے۔

درست	غلط	معلوم نہیں

۱۷۔ اگر ذیابیطس اچھی طرح کنٹرول میں ہو تو آنکھوں کے معائنے کے لیے آفتھالموسکوپ (آنکھوں کی بینائی کو چیک کرنے کا خاص آلہ) کے ذریعے آنکھوں کا معائنہ کرنے کی ضرورت نہیں۔

درست	غلط	معلوم نہیں

۱۸۔ عام طور پر ان لوگوں کو آنکھوں کے معائنے کے لیے خاص مشین کی ضرورت نہیں پڑتی جن کا علاج صرف پرہیزی غذا کیا جا رہا ہو۔

درست	غلط	معلوم نہیں

۱۹۔ سگریٹ نوشی سے دل کی بیماری اور فالج کے خطرات شکر والے شخص اور غیر شکر والے شخص کے درمیان ایک جیسے ہوتے ہیں۔

درست	غلط	معلوم نہیں

۲۰۔ شراب (الکحل) پینے سے خون میں شکر کی مقدار بڑھ جاتی ہے۔

درست	غلط	معلوم نہیں

۲۱۔ خون میں HbA1c کی مقدار سے پتہ چل سکتا ہے۔۔۔۔۔۔

(ا) کہ آپ کے خون میں شکر کی مقدار کم ہو رہی ہے۔

درست	غلط	معلوم نہیں

(ب) گزشتہ ۶ سے ۸ ہفتوں کی خون میں شکر کی اوسط مقدار کا پتہ چل سکتا ہے۔

درست	غلط	معلوم نہیں

(ج) گزشتہ ۶ سے ۸ دنوں کی خون میں شکر کی اوسط مقدار کا پتہ چل سکتا ہے۔

درست	غلط	معلوم نہیں

(د) گزشتہ ۲۴ گھنٹوں کی خون میں شکر کی اوسط مقدار کا پتہ چل سکتا ہے۔

درست	غلط	معلوم نہیں

۲۲۔ کیا آپ HbA1c کی بلند ترین معیاری مقدار بتا سکتے ہیں؟۔۔۔۔۔۔

معلوم نہیں

۲۳۔ کیا آپ HbA1c کی کم ترین معیاری مقدار بتا سکتے ہیں؟۔۔۔۔۔۔

معلوم نہیں

۲۴۔ خون میں شکر کی مقدار کس حد تک ہونی چاہیے؟

(ا) ۲ سے ۴ ایم مول/ا

(ب) ۴ سے ۸ ایم مول/ا

(ج) ۶ سے ۱۲ ایم مول/ا

(د) ۸ سے ۱۴ ایم مول/ا

(ر) معلوم نہیں

۲۵۔ ذیابیطس والے شخص کا بلڈ پریشر بغیر کسی پیچیدگی کے کس حد تک ہونا چاہیے۔

(ا) ۱۱۰/۸۰ ایم ایم ایچ جی

(ب) ۱۸۰/۹۰ ایم ایم ایچ جی

(ج) ۱۴۰/۸۰ ایم ایم ایچ جی

(د) ۱۵۰/۹۰ ایم ایم ایچ جی

(ر) معلوم نہیں

اپنی دیکھ بھال میں سرگرم عمل گروپ نمبر 2 : پرہیز اور انسولین

<u>انٹرویو لینے والے کے لیے نوٹ :</u>

سوالات کا یہ سیٹ اُن لوگوں کے لیے ہے جو پرہیز اور انسولین کے ذریعے اپنی ذیابیطس کو کنٹرول کرتے ہیں۔

برائے مہربانی سوالات پوچھنے سے پہلے جوابات کا پیمانہ شریک گفتگو کو دیں۔

اب میں آپ سے یہ جاننا چاہوں گا رگی کہ آپ روزانہ ذیابیطس کی دیکھ بھال کن طریقوں سے کرتے ہیں۔

یہ سوالات پچھلے سوالات سے ملتے جلتے ہیں۔ آپ کو ایک جواب چننا ہوگا جو گزشتہ سات دنوں میں آپ نے جس طریقے سے اپنی ذیابیطس کی دیکھ بھال کی کی بہترین وضاحت کرتا ہو۔

1. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ تازہ پھل، تازہ سبزیاں، ہول گرین بریڈ، خشک میوہ، اور مٹر وغیرہ اپنے کھانے میں شامل کیے ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
1	2	3	4	5	6	7	8

2. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ مکھن، گھی، آئس کریم، تیل، گوشت، مائینیز، ایواکیڈو، تلی ہوئی اشیاء مثلاً پکوڑے، سموسہ، گھی میں تلے ہوئے پراٹھے یا ساتھ چاول، سلاد اور دوسرا گوشت چربی یا چمڑی کے ساتھ اپنے کھانے میں شامل کیے ہیں ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

3. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ میٹھی اشیاء مثلاً لڈو، جلیبی، گاجر حلوہ، مٹھائی، شہد، پائے، کیک، جیلی، میٹھے مشروبات اور مسٹرڈ وغیرہ اپنے کھانے میں شامل کیے ہیں ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

4. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ کوئی ورزش (چلنا وغیرہ) کی جو کم از کم بیس (۲۰) منٹ تک جاری رہی ہو ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

5. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ اپنے خون میں شکر کی مقدار ٹیسٹ کی؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	۵	۴	4	3	2	1

6. آپ ذیابیطس کے لیے تجویز کی گئی گولیوں کو کتنا غیر آرام دہ یا تکلیف دہ محسوس کرتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

7. ذیابیطس کی گولیوں کے ناخوشگوار اثرات آپ کو کتنا متاثر کرتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

8. آپ ذیابیطس کے لیے تجویز کی گولیاں کتنی مرتبہ لینا بھول جاتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

9. آپ ذیابیطس کی اپائنٹمنٹ پر جانا کتنی مرتبہ بھول جاتے ہیں؟

ہمیشہ	عموماً	بعض اوقات	کم ہی	کبھی نہیں
0	1	2	3	4

اپنی دیکھ بھال میں سرگرم عمل گروپ نمبر ۱: پرہیز اور گولیاں

انٹرویو لینے والے کے لیے نوٹ:

سوالات کا یہ سیٹ ان لوگوں کے لیے ہے جو پرہیز اور گولیوں کے ذریعے اپنی ذیابیطس کو کنٹرول کرتے ہیں۔

برائے مہربانی سوالات پوچھنے سے پہلے جوابات کا پیمانہ شریک گفتگو کو دیں۔

اب میں آپ سے یہ جاننا چاہوں گا/گی کہ آپ روزانہ ذیابیطس کی دیکھ بھال کن طریقوں سے کرتے ہیں۔

یہ سوالات پچھلے سوالات سے ملتے جلتے ہیں۔ آپ کو ایک جواب چننا ہوگا جو گزشتہ سات دنوں میں آپ نے جس طریقے سے اپنی ذیابیطس کی دیکھ بھال کی کی بہترین وضاحت کرتا ہو۔

1. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ تازہ پھل، تازہ سبزیاں، ہول گرین بریڈ، خشک بین، اور مٹر وغیرہ اپنے کھانے میں شامل کیے؟

سات دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
1	2	3	4	5	6	7	8

2. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ مکھن، گھی، آئس کریم، تیل، کوکونٹ، مائنیز، ایواکیڈو، تلی ہوئی اشیاء مثلاً بھٹورہ، گھی میں تلے ہوئے باسماتی چاول، سلاد اور دوسرا گوشت چربی یا چمڑی کے ساتھ اپنے کھانے میں شامل کیے ہیں؟

سات دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
9	7	6	5	4	3	2	1

3. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ میٹھی اشیاء مثلاً لڈو، جلیبی، گاجر حلوہ، مٹھائی، شہد، پائی، کیک، جیلی، ہلکے مشروبات اور لسی وغیرہ اپنے کھانے میں شامل کیے ہیں؟

سات دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

4. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ کوئی ورزش (چلنا وغیرہ) کی جو کم از کم بیس (۲۰) منٹ تک جاری رہی ہو؟

سات دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

5. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ اپنے خون میں شکر کی مقدار ٹیسٹ کی؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

6. آپ ذیابیطس کے لیے تجویز کی گئی گولیوں کو کتنا غیر آرام دہ یا تکلیف دہ محسوس کرتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

7. ذیابیطس کی گولیوں کے ناخوشگوار اثرات آپ کو کتنا متاثر کرتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

8. آپ ذیابیطس کے لیے تجویز کی گولیاں کتنی مرتبہ لینا بھول جاتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

9. آپ ذیابیطس کی اپائنٹمنٹ پر جانا کتنی مرتبہ بھول جاتے ہیں؟

ہمیشہ	عموماً	بعض اوقات	کم ہی	کبھی نہیں
0	1	2	3	4

اپنی دیکھ بھال میں سرگرم عمل گروپ نمبر 3 : پرہیز کے ساتھ بلڈ پریشر کی گولیاں

انٹرویو لینے والے کے لیے نوٹ :

سوالات کا یہ حصہ اُن لوگوں کے لیے ہے جو ذیابیطس کو کنٹرول کرنے کے لیے پرہیز کے ساتھ بلڈ پریشر کی گولیاں استعمال کرتے ہیں۔

برائے مہربانی سوالات پوچھنے سے پہلے جوابات کا پیمانہ شریک گفتگو کو دیں۔

اب میں آپ سے یہ جاننا چاہوں گا / گی کہ آپ روزانہ ذیابیطس کی دیکھ بھال کن طریقوں سے کرتے ہیں۔

یہ سوالات پچھلے سوالات سے ملتے جلتے ہیں۔ آپ کو ایک جواب چننا ہو گا جو گزشتہ سات دنوں میں آپ نے جس طریقے سے اپنی ذیابیطس کی دیکھ بھال کی کی بہترین وضاحت کرتا ہو۔

1. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ تازہ پھل، تازہ سبزیاں، ہول گرین بریڈ، خشک بین، اور مٹر وغیرہ اپنے کھانے میں شامل کیے ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
1	2	3	4	5	6	7	8

2. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ مکھن، گھی، آئس کریم، تیل، کھوپرا، مائنیز، ایواکیڈو، تلی ہوئی اشیاء مثلاً پکوڑے، سموسے، گھی میں تلے ہوئے یا سادہ چاول، سلاد اور دوسرا گوشت چربی یا چمڑی کے ساتھ اپنے کھانے میں شامل کیے ہیں ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

3. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ میٹھی اشیاء مثلاً لڈو، جلیبی، گاجر حلوہ، مٹھائی، شہد، پائی، کیک، جیلی، ہلکے مشروبات اور کسٹرڈ وغیرہ اپنے کھانے میں شامل کیے ہیں ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

4. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ کوئی ورزش (چلنا وغیرہ) کی جو کم از کم بیس (۲۰) منٹ تک جاری رہی ہو ؟

ساتوں دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	3	2	1

5. گزشتہ سات دنوں میں آپ نے کتنی مرتبہ اپنے خون میں شکر کی مقدار ٹیسٹ کی؟

سات دن	چھ دن	پانچ دن	چار دن	تین دن	دو دن	ایک دن	ایک دن بھی نہیں
8	7	6	5	4	6	2	[illegible]

6. آپ بلڈ پریشر کے لیے تجویز کی گئی گولیوں کو کتنا غیر آرام دہ یا تکلیف دہ محسوس کرتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

7. بلڈ پریشر کی گولیوں کے ناخوشگوار اثرات آپ کو کتنا متاثر کرتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

8. آپ بلڈ پریشر کے لیے تجویز کی گولیاں کتنی مرتبہ لینا بھول جاتے ہیں؟

ہر وقت	اکثر اوقات	کئی مرتبہ	کبھی کبھی	بالکل نہیں
0	1	2	3	4

9. آپ ذیابیطس کی اپائنٹمنٹ پر جانا کتنی مرتبہ بھول جاتے ہیں؟

ہمیشہ	عموماً	بعض اوقات	کم ہی	کبھی نہیں
0	1	2	3	4

Interview Schedule in Thailand

Interview-Schedule for people with diabetes in Thailand

By: Khanungnit Kym Pisitchayakhon-Garnett

Medical Education Department, University of Warwick, UK

Interviewer name:...

Part 1. Demographic information

Name: ....

Address: ....

....

Please circle the number in front of the preferring answer.

[1.]

1. Male	2. Female

[2.] What is your current marital status?

1. Single	2. Married	3. Divorced	4. Widowed

[3.] Year born: ....

[4.] What is your weight? ....Kilograms

[5.] How tall are you? .... Centimetres

[6.] What is your nationality? ....

[7.] Can you please specify your religion, if you have got one?

1. Buddhism	2. Islam	3. Christian	4. Other....................

[8.] How often do you do your religious practice?

1. Not at all	2. Not very often	3. Sometimes	4. All the time

[9.] What is your current occupation?

1. Pensioners/housewife	2. Professionals	3. Manual workers/farmers

[10.] Which is your monthly income range (Baht)?

1. Less than 3,000	2. 3,001-5,000	3. 5,001-7,000	4. 7,001-9,000	5 More than 9,001

[11.] Number of people living in the house at present (except children aged less than 2 years old) ....

[12.] What is your educational background?

1. None	2. Primary school	3. Secondary school	4. High school	5. College/University

[13.] How long have you been diagnosed with diabetes? ....

[14.] Your diabetes is current controlled by:

1. Diet only	2. Diet + tablets	3. Diet + insulin

[15.] Please select health provider(s) involving with your diabetes care:

1. Hospital	2. Private clinic	3. Local health centre	4. Other..................

[16.] How far is it from your house to the diabetes health centre? .... Kilometres

[17.] How long does it take from your house to the diabetes health centre? ....Minutes

[18.] Which type of transport do you use when attending your diabetes appointment?

1. Public transports	2. Own transport

[19.] Have you suffered from any diabetic complication(s) since you were diagnosed with diabetes?

....

....

Part 2. Use of medicinal plants and/or herbs for diabetes

[20.] Do you use medicinal plants and/or herbs for your diabetes at present?

1. Yes	2. No

[21.] If yes, please specify their names and part of plant used

....

....

....

[22.] How long have you been using these plants? ....(years/months)

[23.] How often do you use these medicinal plants for you diabetes?

1. Everyday	2. More than once a week	3. More than once a month	4. Don't know

[24.] How did you know about their beneficial effects for diabetes?

....

....

[25.] Have you informed about this usage to your diabetologist?

0. No	1. Yes

[26.] Would you recommend this kind of treatment to anyone with diabetes?

0. No	1. Yes

[27.] If yes, please specify your opinion:

....

....

ATT19 Attitudinal assessment for people with diabetes

Instruction: This form contains 19 questions, which tests your feeling about diabetes and the impact diabetes to your life. There is no right or wrong answer as everyone has the right to his/her own opinion. Please do not spend too long on each question.

You can choose the following five options:

Completely disagreed   Disagree   Undecided   Agree   Completely agree

	Completely disagreed	Disagree	Undecided	Agree	Completely agree
1. If I did not have diabetes I think I will be a different person					
2. I don't like people to say that "I have diabetes"					
3. Diabetes is the worse thing that happened to me					
4. Most people will have a difficulty in adjusting to having diabetes					
5. I feel ashamed that I have diabetes					
6. It seems like I can't do very much for the control of my diabetes					
7. Having diabetes gives me no hope in leading a normal life					
8. A well-controlled diabetes needs scarifying and endurance to many most uncomfortable things					
9. I try not to let anyone know					

that I am diabetic	
10. When I was told I have diabetes, I feel like I have been punished to be ill for the rest of my life	
11. Foods for the diabetics do not have any impact to my social life	
12. In general, the doctors will need to have more understanding when treating people with diabetes	
13. Having diabetes for a long time changes the personality	
14. I can not tell if I feel unwell or not	
15. Diabetes is not the biggest problem because it can be controlled	
16. You can't do very much if you are diabetic	
17. I feel like I can't talk openly to anyone about my diabetes	
18. I believe that I can adjust very well to having diabetes	
19. I always think that it is not fair that I have diabetes when other people are well	

Satisfaction form in having diabetes:

The following questions are concerning your diabetes treatment (includes use of insulin, tablets and/or diet) and your experience in the past few weeks. Please answer by circle around the number in each question.

1. How satisfy are you with your current treatment?

Totally satisfy	6	5	4	3	2	1	0	Totally dissatisfy

2. How often have you felt that your blood sugar have been unacceptably high recently?

All the time	6	5	4	3	2	1	0	None of the time

3. How often have you felt that your blood sugar have unacceptably low recently?

All the time	6	5	4	3	2	1	0	None of the time

4. How convenient have your treatment been recently?

Very comfortable	6	5	4	3	2	1	0	Not very comfortable

5. How flexible have your treatment been recently?

Very flexible	6	5	4	3	2	1	0	Not very flexible

6. How satisfy are you with the your understanding of your diabetes?

Totally satisfy	6	5	4	3	2	1	0	Not totally satisfy

7. Will you recommend this kind of treatment to someone with the same diabetes as yourself?

Most definitely	6	5	4	3	2	1	0	Not at all

8. How satisfy would you to continue with your current treatment?

Very satisfy	6	5	4	3	2	1	0	Not very satisfy

Diabetes Knowledge Questionnaire

Name: ....Age: ....Sex: ....M/F)
How long have you had diabetes? ....
How do you control your diabetes? (Circle one answer only) diet + tablets, diet + insulin

Instruction: This quiz aims to find out how much you do know about your diabetes. There are 15 questions and each one has several possible answers. Questions 1 to 12 have only one possible answer. Please circle the letter in front of your answer, which you think is correct. If you don't know the answer please circle the letter in front of "don't know". Please notice that questions 13, 14 and 15 have more than one correct answer, so you should circle the answers you believe is right.

1. **When a person with diabetes on insulin undertakes unusually heavy exercise, they should:**
   A. More insulin before exercise
   B. More carbohydrate foods before exercise
   C. Less foods before exercise
   D. Don't know
2. **A person with diabetes should:**
   A. Have foods which cook separately from the rest of the family
   B. Eat the same foods at the same time each day
   C. Eat various foods by substituting different foods correctly from the exchange list
   D. Don't know
3. **What is a normal range of blood sugar level?**
   A. 72 – 144 mg/dL
   B. 126 – 270 mg/dL
   C. 36 – 180 mg/dL
   D. Don't know
4. **Rice contains:**
   A. Protein
   B. Carbohydrate
   C. Fat
   D. Mineral and vitamin
   E. Don't know
5. **Insulin causes blood sugar to:**
   A. Decrease
   B. Increase
   C. Neither A nor B
   D. Don't know
6. **Which of the following foods have high carbohydrate?**
   A. Meat
   B. Egg
   C. Cheese
   D. Rice
   E. Don't know
7. **Which of the following symptoms that is not usually associated with hypoglycaemia?**
   A. Tiredness
   B. Hunger
   C. Chest pain
   D. Don't know

8. **If a person takes insulin has high ketone levels and sugar in the urine or blood should:**
   A. Increase insulin
   B. Decrease insulin
   C. Keep insulin and eat the same and test blood/urine
   D. Don't know
9. **When a person with diabetes on insulin becomes unwell and unable to eat the prescribed foods, he/she should:**
   A. Stop using insulin immediately
   B. Continue using insulin
   C. Use tablets instead of insulin
   D. Don't know
10. **Which of the following foods that you can eat as much as you wish?**
   A. Fruit
   B. Lettuce
   C. Steak
   D. Honey
   E. Don't know
11. **A person with diabetes should avoid being overweight because:**
   A. Insulin can be harmful to overweight people
   B. Being overweight makes diabetes worse
   C. Hypoglycaemic attack can occur more often with the overweight people
   D. Don't know
12. **Hypoglycaemia is caused by:**
   A. Too much insulin
   B. Too little insulin
   C. Too little exercise
   D. Don't know

These last three questions have more than one possible answer. Please circle the one you think is right.

13. **Which of the following so-called "diabetic" foods that are approved by the Diabetic clinic?**
   A. Diabetic jam
   B. Diabetic jelly
   C. Sorbitol-sweetened, sugar free canned-fruit
   D. "Low calories" soft drinks
   E. Don't know
14. **If someone with diabetes becomes sick and has vomiting and diarrhoea he/she should:**
   A. Stop drinking and eating all types of foods
   B. Continue taking insulin injection and tablet as usual
   C. Take sugar free drinks every two hours
   D. Contact a doctor if vomit persists
   E. Don't know

15. Special diabetic foods are:

A. Forbidden in a diabetic diet

B. Necessary in a diabetic foods

C. Acceptable, if it is used selectively and correctly

D. Usually more expensive than foods for non-diabetic equivalent

E. Don't know

ATT19, Treatment Satisfaction, DKN – Thai version

ATT19 แบบทดสอบการปรับตัวทางด้านจิตใจของคนที่เป็นโรคเบาหวาน

คำแนะนำ : แบบสอบถามนี้ประกอบด้วยคำถาม 19 ข้อ
มีจุดมุ่งหมายเพื่อต้องการทราบความรู้สึกของท่านเกี่ยวกับโรคเบาหวาน
และผลกระทบอันเกิดจากโรคเบาหวานที่มีต่อชีวิตของท่าน
เนื่องจากทุกคนมีสิทธิ์ที่จะแสดงความคิดเห็นของตนเอง จึงไม่มีคำตอบที่ "ถูก" หรือ "ผิด"
โปรดอย่าเสียเวลาตอบคำถามแต่ละข้อมากเกินไป ท่านสามารถเลือกตอบได้ 5 อย่าง ดังนี้

ไม่เห็นด้วยอย่างยิ่ง ไม่เห็นด้วย ไม่ทราบ เห็นด้วย เห็นด้วยอย่างยิ่ง

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่ทราบ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
1. หากฉันไม่เป็นโรคเบาหวานฉันคงจะเป็นคนอีกแบบหนึ่งที่แตกต่างไปจากนี้มาก					
2. ฉันไม่ชอบให้ใครมาพูดถึงฉันว่า "คนเป็นโรคเบาหวาน"					
3. โรคเบาหวานเป็นสิ่งที่ร้ายแรงที่สุดที่เกิดขึ้นกับฉัน					
4. คนส่วนใหญ่จะปรับตัวกับการเป็นโรคเบาหวานได้ยาก					
5. ฉันมักจะรู้สึกอับอายกับการเป็นโรคเบาหวาน					
6. ดูเหมือนว่าฉันจะไม่สามารถทำอะไรได้มากนักกับการควบคุมโรคเบาหวานของฉัน					
7. การเป็นโรคเบาหวานทำให้ไม่ค่อยมีหวังในการที่จะดำเนินชีวิตได้ตามปกติ					
8. การควบคุมโรคเบาหวานที่ดีต้องอาศัยการเสียสละและทนต่อความไม่สะดวกสบายอย่างมาก					
9. ฉันพยายามที่จะไม่ให้ใครรู้ว่าฉันเป็นโรคเบาหวาน					
10. เมื่อมีคนบอกให้ทราบว่าเป็นโรคเบาหวาน ฉันรู้สึกเหมือนกับถูกตัดสินลงโทษให้เจ็บป่วยตลอดชีวิต					
11. อาหารสำหรับคนเป็นโรคเบาหวานมิได้มีผลต่อชีวิตด้านสังคมของฉันมากนัก					
12. โดยทั่วไปแล้วแพทย์จำเป็นต้องมีความเห็นอกใจมากกว่านี้ในการรักษาผู้ที่เป็นโรคเบา-หวาน					
13. การเป็นโรคเบาหวานเป็นระยะเวลานานจะทำให้บุคลิกเปลี่ยนแปลง					

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่ทราบ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
14. ฉันมักจะบอกไม่ค่อยได้ว่าฉันรู้สึกไม่สบาย หรือสบายดี					
15. โรคเบาหวานมิได้เป็นปัญหาที่ร้ายแรง เพราะสามารถควบคุมได้					
16. คุณไม่มีทางที่จะทำอะไรได้เลยหากคุณเป็นโรคเบาหวาน					
17. ฉันรู้สึกว่าไม่มีใครเลยที่ฉันจะสามารถพูดคุยด้วยได้อย่างเปิดอกเกี่ยวกับโรคเบาหวานของฉัน					
18. ฉันเชื่อว่าฉันได้ทำการปรับตัวอย่างดีกับการเป็นโรคเบาหวาน					
19. ฉันมักจะคิดอยู่เสมอว่าไม่ยุติธรรมเลยที่ฉันเป็นโรคเบาหวานในขณะที่คนอื่นๆ มีสุขภาพดี					

แบบสำรวจความพอใจในการรักษาโรคเบาหวาน :
คำถามต่อไปนี้จะเกี่ยวกับการรักษาโรคเบาหวานของท่าน (รวมถึงการใช้อินซูลิน ยาเม็ด และ/หรือ ควบคุมด้วยอาหาร) และประสบการณ์ของท่านในช่วงไม่กี่สัปดาห์ที่ผ่านมา
โปรดตอบคำถามโดยการกาวงกลมล้อมรอบตัวเลขบอกระดับคะแนนในแต่ละข้อ

1. ท่านพอใจมากน้อยเพียงใดกับการรักษาโรคเบาหวานของท่านในขณะนี้?

พอใจมาก	6	5	4	3	2	1	0	ไม่พอใจอย่างยิ่ง

2. ในช่วงเวลาที่เพิ่งผ่านมาบ่อยครั้งแค่ไหนที่ท่านรู้สึกว่าระดับน้ำตาลในเลือดของท่านสูงเกินกว่าที่ควร?

เกือบตลอดเวลา	6	5	4	3	2	1	0	ไม่มีเลย

3. ในช่วงเวลาที่เพิ่งผ่านมาบ่อยครั้งแค่ไหนที่ท่านรู้สึกว่าระดับน้ำตาลในเลือดของท่านต่ำเกินกว่าที่ควร?

เกือบตลอดเวลา	6	5	4	3	2	1	0	ไม่มีเลย

4. ในช่วงเวลาที่เพิ่งผ่านมา ท่านคิดว่าการรักษาโรคเบาหวานของท่านทำได้สะดวกมากน้อยเพียงใด?

สะดวกมาก	6	5	4	3	2	1	0	ไม่สะดวกอย่างยิ่ง

5. ในช่วงเวลาที่เพิ่งผ่านมาท่านคิดว่าการรักษาโรคเบาหวานของท่านมีความยืดหยุ่นมากน้อยเพียงใด?

ยืดหยุ่นมาก	6	5	4	3	2	1	0	ไม่ยืดหยุ่นอย่างยิ่ง

6. ท่านพอใจมากน้อยเพียงใดกับความรู้ความเข้าใจที่ท่านมีเกี่ยวกับโรคเบาหวานของท่าน?

พอใจมาก	6	5	4	3	2	1	0	ไม่พอใจอย่างยิ่ง

7. ท่านจะแนะนำการรักษาวิธีนี้ให้แก่คนอื่นที่มีอาการโรคเบาหวานแบบเดียวกับท่านหรือไม่?

จะแนะนำวิธีการรักษานี้แน่นอน	6	5	4	3	2	1	0	จะไม่แนะนำวิธีการรักษานี้เด็ดขาด

8. ท่านจะพอใจมากน้อยเพียงใดหากจะต้องรับการรักษาด้วยวิธีในปัจจุบันต่อไปอีกเรื่อยๆ?

พอใจมาก	6	5	4	3	2	1	0	ไม่พอใจอย่างยิ่ง

โปรดตรวจดูว่าท่านได้กาวงกลมล้อมรอบระดับคะแนนตัวเลขที่ต้องการครบทุกข้อแล้ว

แบบสอบถามความรู้เกี่ยวกับโรคเบาหวาน

ชื่อ :..

อายุ :............................ เพศ :.............................. (ช หรือ ญ)

ท่านเป็นเบาหวานมานานเท่าไร ....

ท่านรักษาด้วยวิธีการอย่างไร (กาข้อเดียว) ควบคุมอาหารและทานยาเม็ด ....

ควบคุมอาหารและฉีดอินซูลิน ....

คำแนะนำ :
แบบสอบถามนี้มีจุดมุ่งหมายเพื่อสำรวจดูว่าท่านมีความรู้มากน้อยเพียงใดเกี่ยวกับโรคเบาหวาน คำถามทั้งหมดมีอยู่ 15 ข้อ แต่ละข้อจะมีคำตอบให้เลือกตามที่ท่านต้องการ คำถามข้อ 1 ถึง 12 จะมีคำตอบที่ถูกเพียงข้อเดียว โปรด<u>กาวงกลมล้อมรอบ</u>ข้อที่ท่านเห็นว่าถูกต้อง หากท่านไม่ทราบคำตอบ กรุณากาวงกลมล้อมรอบข้อ "ไม่ทราบ" โปรดสังเกตว่าคำถามข้อ 13, 14 และ 15 มีคำตอบที่ถูกมากกว่าหนึ่งข้อ ท่านจึงควรกาวงกลมล้อมรอบคำตอบทุกข้อที่ท่านคิดว่าถูกต้อง

1. คนเป็นเบาหวานที่ใช้อินซูลินควรทำอย่างไรเมื่อต้องออกกำลังกายมากกว่าปกติ

ก. เพิ่มจำนวนอินซูลินก่อนออกกำลังกาย

ข. เพิ่มอาหารประเภทคาร์โบไฮเดรตก่อนออกกำลังกาย

ค. ลดปริมาณอาหารก่อนออกกำลังกาย

ง. ไม่ทราบ

2. คนเป็นโรคเบาหวานควรทำดังนี้ :

ก. รับประทานอาหารที่ปรุงแยกต่างหากจากของคนในครอบครัว

ข. รับประทานอาหารชนิดเดียวกันในเวลาเดียวกันทุกวัน

ค. รับประทานอาหารหลายชนิดโดยสับเปลี่ยนรายการอาหารอย่างถูกต้องตามรายการที่จัดไว้

ง. ไม่ทราบ

3. ระดับน้ำตาลกลูโคสในโลหิตตามปกติจะอยู่ระหว่าง :

ก. 72 - 144 มก./ดล.

ข. 126 - 270 มก./ดล.

ค. 36 - 180 มก./ดล.

ง. ไม่ทราบ

4. สารอาหารส่วนใหญ่ในข้าว คือ :

ก. โปรตีน

ข. คาร์โบไฮเดรต

ค. ไขมัน

ง. เกลือแร่ และวิตามิน

จ. ไม่ทราบ

5. อินซูลินมีผลทำให้ระดับน้ำตาลในเลือด :

ก. ลดลง

ข. เพิ่มขึ้น

ค. ไม่ถูกทั้ง ก และ ข

ง. ไม่ทราบ

6. อาหารประเภทใดต่อไปนี้ที่มีคาร์โบไฮเดรตสูง

ก. เนื้อ

ข. ไข่

ค. เนย

ง. ข้าวสาลี

จ. ไม่ทราบ

กรุณาพลิกดูหน้าต่อไป

7. อาการใดบ้างต่อไปนี้ที่ปกติจะไม่เกี่ยวข้องกับภาวะระดับน้ำตาลในโลหิตต่ำ (ไฮโปไกลซีเมีย)
ก. อ่อนเพลีย
ข. หิว
ค. เจ็บหน้าอก
ง. ไม่ทราบ

8. ผู้ใช้อินซูลินที่มีระดับสารคีโทนและน้ำตาลสูงในปัสสาวะหรือเลือด ควรทำดังนี้ :
ก. เพิ่มจำนวนอินซูลิน
ข. ลดจำนวนอินซูลิน
ค. ใช้อินซูลินและทานอาหารเหมือนเดิม แล้วตรวจดูเลือด / ปัสสาวะ
ง. ไม่ทราบ

9. เมื่อคนเป็นโรคเบาหวานที่ใช้อินซูลินไม่สบายและไม่สามารถรับประทานอาหารตามรายการที่จัดให้ เขา / เธอ ควรทำดังนี้ :
ก. หยุดใช้อินซูลินทันที
ข. ใช้อินซูลินต่อไป
ค. ใช้ยาเม็ดแทนอินซูลิน
ง. ไม่ทราบ

10. อาหารใดบ้างต่อไปนี้ที่ท่านสามารถรับประทานได้มากตามที่ใจต้องการ
ก. ผลไม้
ข. ผักกาดหอม
ค. เนื้อสเต็ก
ง. น้ำผึ้ง
จ. ไม่ทราบ

11. ท่านที่เป็นโรคเบาหวานไม่ควรปล่อยตัวให้มีน้ำหนักมากเกินไป ด้วยเหตุผลดังนี้ :
ก. อินซูลินอาจเป็นอันตรายต่อคนที่อ้วนมากเกินไป
ข. การอ้วนมากเกินไปทำให้ยิ่งเป็นเบาหวาน
ค. ภาวะน้ำตาลในโลหิตต่ำอย่างฉับพลันจะเกิดบ่อยกับคนที่อ้วนมากเกินไป
ง. ไม่ทราบ

12. ภาวะน้ำตาลในโลหิตต่ำ (ไฮโปไกลซีเมีย) เกิดขึ้นเพราะ :
ก. อินซูลินมากเกินไป
ข. อินซูลินน้อยเกินไป
ค. ไม่ค่อยออกกำลังกาย
ง. ไม่ทราบ

คำถามสามข้อสุดท้ายต่อไปนี้มีคำตอบที่ถูกต้องมากกว่า 1 ข้อ โปรดกาวงกลมล้อมรอบข้อที่ท่านคิดว่าถูกที่สุด

13. อาหารสำหรับคนเป็น "เบาหวาน" ชนิดใดบ้างต่อไปนี้ที่คลีนิคโรคเบาหวานรับรองแล้ว
ก. แยมสำหรับคนเป็นเบาหวาน
ค. เยลลี่สำหรับคนเป็นเบาหวาน
ค. ผลไม้กระป๋องที่ใช้ซอร์บิทอลให้ความหวานแทนน้ำตาล
ง. น้ำอัดลมประเภท "แคลอรี่ต่ำ"
จ. ไม่ทราบ

14. คนเป็นโรคเบาหวานที่เกิดอาการคลื่นไส้ อาเจียนและท้องร่วง ควรทำดังนี้ :
ก. หยุดดื่มและรับประทานอาหารทุกชนิด
ข. ฉีดอินซูลิน / ทานยาเม็ด ตามปกติ
ค. ดื่มเครื่องดื่มที่ปราศจากน้ำตาลทุกๆ 2 ชั่วโมง
ง. ควรปรึกษาแพทย์เมื่อยังไม่หายอาเจียน
จ. ไม่ทราบ

15. อาหารพิเศษสำหรับคนเป็น "เบาหวาน" :
ก. เป็นอาหารต้องห้ามในรายการอาหารสำหรับคนเป็นเบาหวาน
ข. เป็นอาหารที่จำเป็นในรายการอาหารสำหรับคนเป็นเบาหวาน
ค. สามารถใช้ได้ แต่ต้องเลือกเฟ้นให้ดีและถูกต้อง
ง. ปกติจะแพงกว่าอาหารแบบเดียวกันที่ไม่ใช่อาหารสำหรับคนเป็นเบาหวาน
จ. ไม่ทราบ